DISCOVERY

A MONTHLY POPULAR JOURNAL OF KNOWLEDGE

EDITED BY EDWARD LIVEING, B.A.
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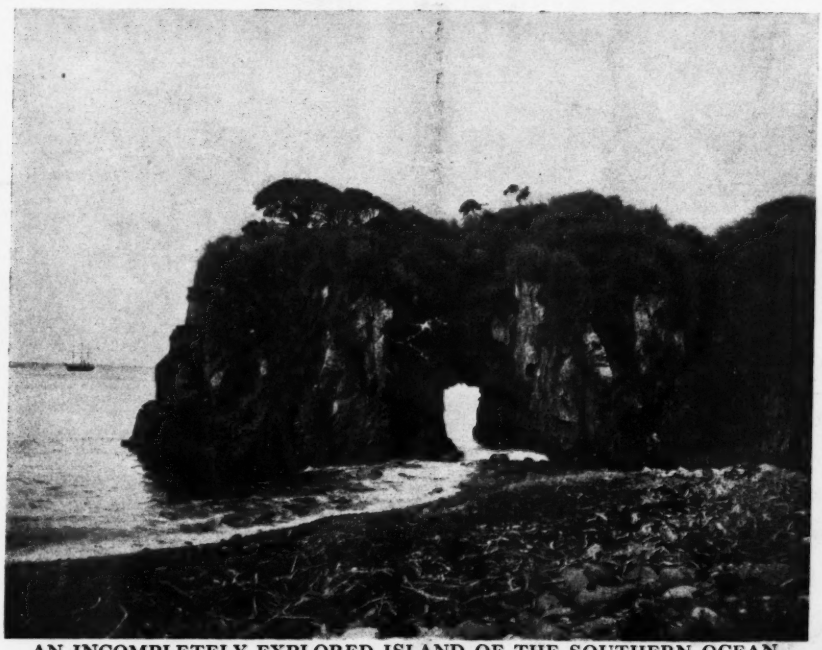

AN INCOMPLETELY EXPLORED ISLAND OF THE SOUTHERN OCEAN
Gough Island, with the *Scotia*, which visited it in 1904, in the distance
(Photo by W. S. Bruce.)

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DISCOVERY. A Monthly Popular Journal of Knowledge.

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Editorial Notes

FIFTY years ago Charles Darwin published a book called *The Expression of the Emotions in Man and Animals.* In many ways this book consolidated the foundations of the patient study, experiment, and research since bestowed upon the functions and nature of the ductless glands, or endocrine system, in the bodies of men and animals. In this direction remarkable discoveries have been made during the last half-century by English, American, and German physiologists, the results of which best known to the general public consist in the enormous relief afforded, by the feeing or injection of extract of the appropriate sheep glands, notably of the thyroid, to persons suffering from insufficiency of secretions from such glands. During the last few years some of the most striking researches in this problem of physiology have been made by British doctors and scientists, such as Langdon Brown [1] and Swale Vincent,[2] and in the field of experimentation with animals by Huxley and Hogben. Their work has shown the extreme complexity of the ductless glands in their relations with the rest of the human system, and how, after half a century's most careful study, we are only on the outskirts of a most baffling problem.

* * * * *

In its wider issues it connects up with the problem of personality, which is being probed from a different angle by psychologists. Undoubtedly we have in the past disregarded the body as a factor in personality, and have been inclined to consider it only as the casing round a soul almost completely dissociated with it. How far can we believe in such an idea in these days? Or, to put the question otherwise, how far are we entitled by purely scientific proofs to disbelieve in it? These are questions which the average man and woman have a right to ask of those scientists who are trying to hammer a way into the light, and who do not and cannot in their special work fall back on the "divine revelation" of any religion. No conscientious scientist can give them a definite answer to these questions. But a physiologist would probably tell them, "There is no doubt that the individual's physiological mode of reaction has a vast bearing on his mental life," and a psychologist that *vice versa* "the great effect of the individual's mental processes on his physical processes is beyond question." Further than this neither can rightly proceed at present. They are working from different angles. How far the two sciences can co-operate is a question to which we will return later.

* * * * *

Meanwhile there is always the danger of the extremist, who does infinite harm to his own cause, and to the general public. On the table before us lies a book entitled *The Glands Regulating Personality.*[3] In this book the author, so we are informed on the wrapper, "shows how man's individuality is controlled by the quality and quantity of internal secretions acting in him." The impression that his book seems intended to leave on the minds of educated but unscientific men is that personality or the human soul is entirely created and controlled by the endocrine glands and their secretions in the body; that the "types" of personality vary according as the body is dominated

[1] See *The Sympathetic Nervous System in Disease,* Chapter II, "The Sympathetic Nervous System in Relation to the Endocrine Glands." (Henry Frowde and Hodder & Stoughton, Ltd., 10*s.*); and a note on "The Position of the Thyroid Gland in the Endocrine System" (*Brit. Med. Journal,* January 21, 1922).

[2] See *Internal Secretion and Ductless Glands.* (Edward Arnold.)

[3] By Louis Berman, M.D. (New York: The Macmillan Company.)

by one of the endocrine glands more powerfully than by any of the remainder. In Chapter X Dr. Berman describes in detail these various "types"—"the adrenal centered, the thyroid centered, the thymus centered, the pituitary centered, the gonad centered, and their combinations." It is only fair to the doctor to say that he admits there are infinite modifications of these main types.

* * * * *

Now for one of the main types: "An adrenal personality is one dominated by the ups and downs of his adrenal gland. In the large, the curve of his life is the curve of secretion by this gland, both of its cortex and medulla. Such an adrenal personality is entirely normal, within the definition of the normal as something not threatening the duration of life, nor comfortable adaptation to it. So are the other glandular types. . . . The epidermis is always slightly, somewhat, or deeply pigmented. . . . The hair is . . . ubiquitous, thick, coarse, and dry. . . . When the pituitary type has a properly co-operating pituitary and thyroid, he possesses a striking vigor, energy, and persistence. With a fortunate combination, he develops into a progressive winning fighter, arriving at the top in the long run every time." And so on. By the end of the chapter the reader is, of course, trying to find which group of personalities he belongs or approximates to, and is in much the same state of mind as a person in a fortune-teller's booth. But, before he has time to recover his wits, he has been plunged into Chapter XI. In Chapter XI he is given extra proof of Chapter X. This proof consists in the application of the findings in Chapter X to "Some Historic Personages." Here he will learn that "the rise and fall of Napoleon followed the rise and fall of his pituitary gland"; that "the physique and physiognomy of Nietzsche, his migraine attacks and the later fate which overtook him, his likes and dislikes, his tastes, abilities, and accomplishments followed from his composition as one pituitary-centered, with post-pituitary domination, a superior thyroid, and inferior adrenals"; and that Oscar Wilde's aberrations may be accounted for by the fact that he was a "thymo-centric"!

* * * * *

You see, it is all so easy and obvious, isn't it? So easy and obvious, indeed, that we are constantly remembering the quotation from Francis Bacon's *Novum Organum* that Dr. Berman has placed upon his title page: "The passage from the miracles of nature to those of art is easy." But, when we come to look at the author's findings more closely, we begin to realise that many of them are entire speculation. Where are the facts, experiments, statistics on which Dr. Berman builds his simple edifice in Chapter X? In illustrating his statements in Chapter X by historical examples in Chapter XI, the author appears to us like the man who got up in the market square and proved that the combination of the colours green and white produces the colour black by showing a piece of black paper which he declared was the result of the combination of white and green. In fact, we found no good reasons given anywhere for allotting certain "types" to certain glands, although abnormal activity of certain endocrine groups (e.g. pituitary, adrenal, and thyroid) can be demonstrated by physiological tests. It does not follow, of course, that Dr. Berman is wrong in associating certain mental types with, let us say, an abnormally active thyroid, but without any facts it is a big jump to say that the gland is the *cause* of the condition. In this connection lies the book's worst flaw—that it pays scarcely any attention to the fact that organs are apt to develop in response to the demands, including the mental demands, made upon them. Dr. Berman's purely physiological explanation of personality is unfair, one-sided, and untenable in these early days of research.

* * * * *

We cannot leave this most ludicrous yet dangerous piece of pseudo-scientific literature without mentioning in detail some of its many inaccuracies. On page 46 we are told that the thyroid gland swells "with sexual excitement, menstruation, and pregnancy"; this is not a constant factor, and *all* the ductless glands play a part in phases of sexual activity. On page 48, that "Under the microscope . . . the thyroid shows remarkable and unique features"; but these "unique" features are also found in the pituitary gland. On page 62 that "the pituitary is a lump of tissue about the size of a pea"; but it is actually a good deal larger. On page 66 that "The giants and ogres of folklore and fairy-tales are favoured with the most extraordinary mental advantages"; on the contrary, they are almost always represented as rather stupid and easily outwitted by the normal man or the cunning dwarf. On page 85 that "Removal of the thymus hastens the development of the gonads"; this statement is not borne out by experiment. On page 188 that "The idea of repression, to the Freudian, means the pushing down into the subconscious of some experience"; before criticising the poor old Freudians, Dr. Berman might at least have mastered their terminology; "repression" means nothing of the kind; the word "suppression" is used for this performance. Again, the conception of a physiological urge or tension as a moving factor in life is, of course, well known. Freud places this urge in the sexual glands; Dr. Berman locates it in the endocrine system, the ductless glands, a theory which is not very logical, seeing that they are of comparatively late develop-

ment in evolution. Lastly, the whole endocrine system is so extremely complex and the different glands so closely interrelated in their functions that they cannot be rightly considered as separate entities. We venture to say that the deeper psychologists and physiologists go into the problem of personality, the more bewildered do they become at its psycho-physiological aspect. The only safe dictum to be made at present is that personality, character, call it what you will, is largely formed by the continuous action and reaction of mind and body upon each other.

* * * * *

We have dealt with Dr. Berman's book, and the questions that it raises, at some length, because it is symptomatic of the present dangerous age of transition in thought and mental attitude through which our whole society is now passing. Generally speaking, the average man and woman up to the end of the eighteenth century went to the Bible for guidance if he was up against questions concerning life or the universe. In Victorian times scientists began, for him, to usurp the place of the Bible; they were ready with the conceit born of newly acquired "knowledge" to put him right on most questions. What is the position now? Scientists, with their vast increase in knowledge, realise how very little they know about anything, and are not willing to give definite statements about the results of their work. Under the circumstances it is not surprising to find that many people are bewildered, and are not certain of where to turn in their efforts to adopt an attitude to life and its problems; that great numbers of our population are being driven, not even into an intelligent agnosticism, but into the most ridiculous extravagances of thought and practice, particularly in connection with the problem of human personality and its survival, by misinformed articles in the press, by pseudo-scientific books such as Dr. Berman's, and by the extremes of spiritualism.

* * * * *

It serves no useful purpose to be pessimistic about the present state of things. But effective remedies are urgently needed. We could not support the idea that a special censorship of popular scientific books should be established. Of more far-reaching importance would be the setting up of a Commission to collate the views of representatives of science, religion, and intellect concerning *The Problem of Human Personality*. The difficulties in the way of such an undertaking are sufficiently numerous and obvious to make the suggestion appear useless. Yet we feel that our journal represents a large body of people with active brains who have a right to demand an answer, however indefinite it be, from those men whose life's work is concerned with various aspects of that subject which has occupied the thoughts of mankind from the dawn of history. We should be glad to receive the views of our readers upon this matter.

* * * * *

All the members of the Mount Everest Expedition have left for India once more. What are their chances of success this time? Mr. Mallory put the question to Mr. Bullock before they parted after their attempt last year. His reply, after long reflection, was: "Fifty to one against." The chief obstacles in negotiating the final six to seven thousand feet appear to be the violent snow blizzards that swirl off the face of the peak and the extreme exhaustion and difficulty in breathing experienced at altitudes over 23,000 feet. The time-honoured principles of mountaineers must also be considered. As Mr. Mallory said in his paper[1] read before a joint meeting of the Royal Geographical Society and the Alpine Club last December: "A party of two arriving at the top, each so tired that he is beyond helping the other, might provide good copy for the press, but the performance would provoke the censure of reasonable opinion. If anyone falls sick at the last camp, he must be taken down with an adequate escort, and as soon as possible; and similarly on the final day. And coolies who become exhausted in carrying up their loads cannot be allowed to make their own way down."

* * * * *

As against these difficulties, the climbers will probably have time to make several attempts on the peak, instead of one, and will also at the start be in "fresh" condition, and not exhausted by three months' climbing and life in high altitudes. Mr. Mallory mentioned another factor in favour of the assault: "The higher one goes, the less will be the effect of any given rise. To ascend the 3,000 feet above 17,000 is notably less laborious than to ascend the next 3,000 up to 23,000 feet; but the atmospheric pressure diminishes less rapidly as one goes up; consequently the difference in effort required between one stage and another should be less at each succeeding stage, and least of all between the last stage and the last but one. I believe it to be possible, at all events, for unladen mountaineers to reach 26,000 feet, and if they can go up so far without exhaustion, I fancy the last 3,000 feet will not prove so very much more tiring as to exclude the possibility of their reaching the summit."

[1] See *The Geographical Journal* for February 1922.

NOTICE

PROFESSOR FLINDERS PETRIE wishes us to state that the dates of the Ist to VIIIth Egyptian dynasties, given according to the Berlin dating in a footnote to his article in the March number, should have been given according to the more correct Egyptian dating, i.e. as 5500–4000 B.C. For further information on this point, we advise our readers to see Flinders Petrie, *Historical Studies*, p. 22.

Lost Islands of the Southern Ocean

By R. N. Rudmose Brown, D.Sc.

In the waste of waters known as the Southern Ocean, which lie south of the three great inhabited continents of the southern hemisphere, the only land areas, beyond the great but little-known continent of Antarctica, are a few scattered islands, some merely detached portions of Antarctica near which they lie, but others tiny specks of land in mid-ocean. Few, if any, of these islands have permanent inhabitants; many of them are little known and imperfectly explored. Apart from the importance some of them, such as South Georgia and Kerguelen, have as whaling and sealing stations—for they have no other economic value—these islands are of scientific interest in throwing light on the distribution of plant and animal life and the former distribution of land connections in the southern hemisphere.

Particular interest attaches to certain islands that have been reported and found a place, albeit a doubtful one, on the chart, but have eluded searchers time and again. Do such islands exist, or were they simply born of imagination or illusion? There is little fine weather in the Southern Ocean; gales and heavy seas are the order of the day throughout the year, and under the lowering skies, particularly in midwinter, visibility is poor. Clouds or icebergs may be mistaken for land, and imagination may take strange forms. I have seen an icemaster, who had twenty years' experience of icebergs and their curious shapes, turn his ship off her course for an hour to make sure that a queer loom on the horizon was an iceberg and not a new island. Conversely it must not be forgotten that the poor visibility which is the rule makes the search for a reported island a matter of difficulty. On one occasion, when a few miles off a lofty volcanic island in the South Sandwich group, I saw no sign of land.

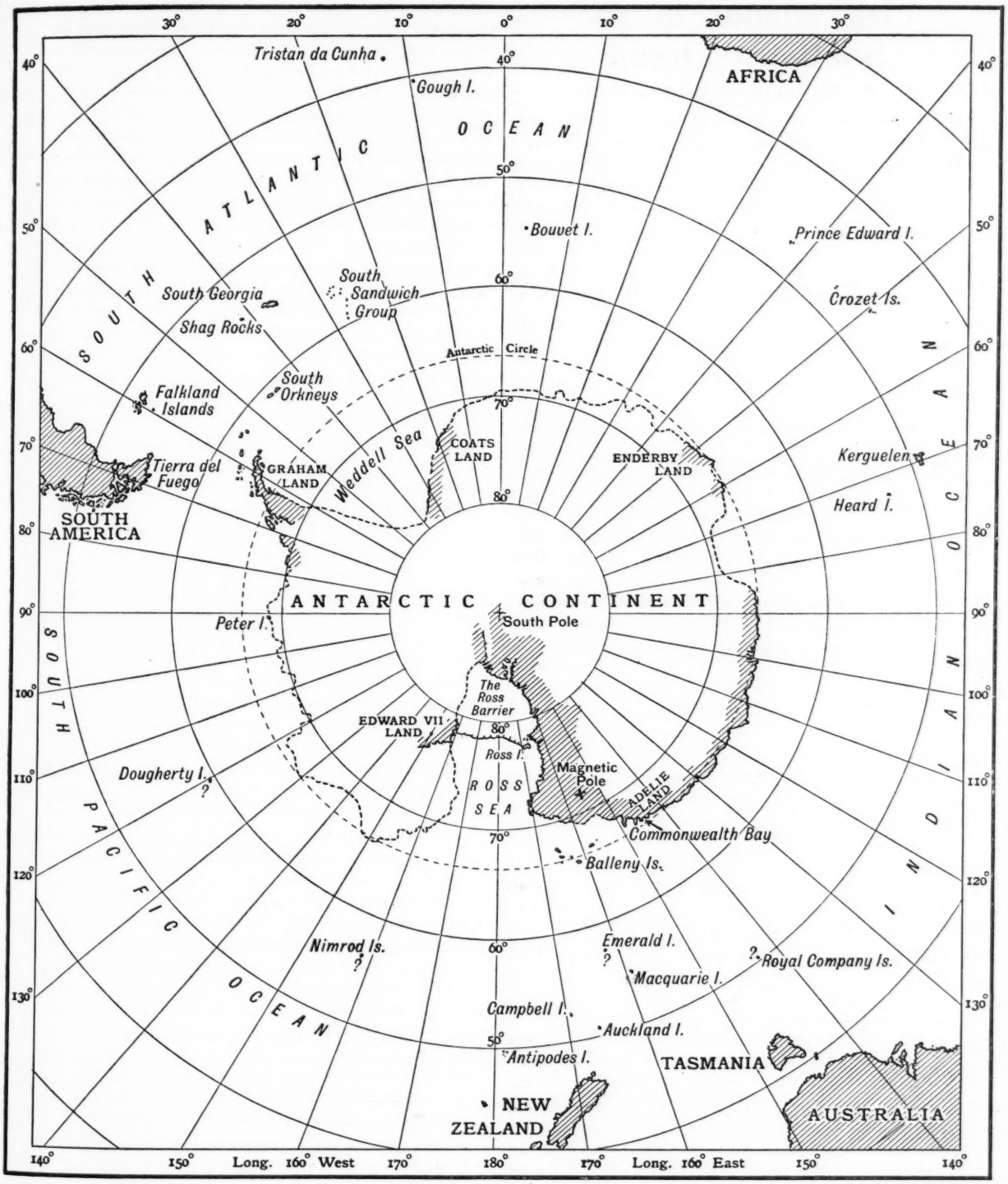
It is far easier for an island to find a place on a chart than to be removed therefrom. A few that figured for many years have already gone or might safely be erased. The Royal Company Islands were reported by a Spanish ship about 1776 to lie south-south-west of Tasmania in about lat. 49° S. and long. 142° E. No one appears to have seen them since, and exhaustive search in the neighbourhood on several occasions has failed to reveal them. Soundings within ninety miles of their reported position show a depth of over 2,000 fathoms.[1] But this fact cannot by itself be accepted as conclusive proof of the non-existence of land, since water of that depth is known to occur much nearer to certain other islands.

[1] *With the "Aurora" in the Antarctic.* J. K. Davis. London, 1919, p. 61.

Emerald Island, farther east and south in the same seas (lat. 57° 15′ S., long. 162° 50′ E.), was reported by a sealer in 1821. At a distance of some twenty-five miles he saw the semblance of an island about thirty miles long, rising into high peaked mountains. In all probability the supposed island was a cloud effect or possibly a gigantic iceberg. Search has failed to rediscover this island, but has shown that huge icebergs may occur in the locality. It has been suggested that Emerald Island was really Macquarie Island, lying about 250 miles to the north-west, for errors in position, especially as regards longitude, were not improbable among sealers a century ago. But, as the vessel after sighting this new island called at Macquarie Island, the explanation will not fit. There is no likelihood that Emerald Island exists. The Aurora Islands in the South Atlantic were reported in 1762, and twice later in the same century, to lie in about lat. 53° S., long. 48° W. This was clearly a case of mistaken longitude, and the Aurora Islands are doubtless identical with the Shag Rocks, a tiny group of jagged rocks, some 150 feet high, the haunt of many sea-birds, but untrodden by man.

Another group which may have to be removed from the chart are the Nimrod Islands, said to have been discovered in lat. 56° 30′ S., long. 158° 30′ W., in 1828 by the ship *Nimrod*. They were sighted at some distance. This position, being well within the limit of floating ice, is off the track of vessels crossing the Southern Pacific, but more than one explorer has sought in vain for the group. Biscoe, however, in 1831, reported many birds and much floating vegetation on the site, but Davis in 1909, strangely enough in another *Nimrod*, found no sign of land. An error in longitude may have displaced this island group many miles. There is yet no proof that it does not exist, although Davis found a depth of 1,140 fathoms within sixteen miles of its reported site.

The case of Dougherty Island, farther east and in a higher latitude than the Nimrod group, presents features of more interest and is not a little mysterious. In lat. 59° 30′ S., long. 100° W., American sealers are said to have known an island called Swain's Island, where at least one cargo of seals was obtained. This was about 1800, and the island seems to have been forgotten when sealing in Antarctic waters was given up. In 1841 Captain Dougherty, in command of a whaler, sighted, at a distance of about 400 yards, an island five to six miles long, with a high bluff at the north-east, and fairly low land at the south-west. Between was a valley covered with snow. He gave its position as about lat. 59° S., long. 120° W. Captain Keates in 1859 sighted a round island about 80 feet high in much the same latitude, but thirty-four miles farther east. Then comes the most remarkable part of the



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story. In 1886 the barque *Cingalese* was close to the island for three days. Her captain described it as six miles long, rising to 300 feet in the north-east, ragged at the south-west, and devoid of snow or vegetation. In 1890 he saw it again. In spite of these circumstantial accounts all recent attempts to find an island in that locality have failed. In 1894 the s.s. *Rimutaka* searched in vain along the parallel of lat. 59° 24′ S. for 144 miles, and the same vessel tried again on other occasions, but with no success. Captain R. F. Scott in 1904 found a depth of 2,318 fathoms on the site of the island[1]; Davis in 1909 searched in vain for land[2]; and the *Carnegie* in 1915 could not find it.[3] The late Sir E. H. Shackleton had intended to search

THE LANDING PLACE ON THE COAST OF GOUGH ISLAND. THE *SCOTIA* IN THE DISTANCE.
Photo by W. S. Bruce.

once more for this elusive island on the present voyage of the *Quest*.

That an island can elude the explorer to such an extent that doubt is cast on its existence is shown in the case of Bouvet Island. In 1739 the French Captain Bouvet, searching for new southern lands with which to trade, sighted land in lat. 54° S., long. 4° 30′ E. Pack-ice prevented a nearer approach than twelve to fifteen miles, but Bouvet described his discovery as high snow-covered land, extending E.N.E. from a lofty headland for some twenty-four to thirty miles. The coast appeared to be steep. Believing that he had found the long-sought southern continent, Bouvet named his discovery Cap de la Circoncision. His second ship gave a slightly different position, and held that the land was an island. Captain James Cook in 1774 could not find Bouvet's land, which remained a half-credited myth till 1808, when Lindsay, a sealer, discovered an island the middle of which he placed in lat. 54° 22′ S., long. 4° 15′ E. He described it as some fifteen miles long, high in the west and low in the east, mainly snow-covered, but bearing some trees or shrubs. Ice prevented a close approach. This was clearly Bouvet's land, but an island and not part of a continent. A few years later, in 1825, another sealer named Norris reached the island, and finding it free of ice, made a closer examination. In lat. 54° 15′ S., long. 5° E., he found a high snow-clad island, fringed by a steep coast. In ignorance of Bouvet's discovery of nearly a century earlier, Norris named this Liverpool Island. On account of bad weather, he did not attempt to land. But now comes the curious part of his story. A few days later he sighted another island, forty-five miles to the north-east, which he named Thompson Island. He described this island as bearing "evident marks of having been a volcano, as it is nothing less than a complete cinder. . . ." His boats were sent round the island in search of seals. They were weather-bound for six days on the island, and a landing was made on the south-west, which appeared to be the only possible place. A further discovery by Norris was a group of three isolated rocks, the Chimneys, five miles south-west of Thompson Island. It is difficult to discredit this story of Norris's, but his second island has remained hidden to this day. Ross could not find Bouvet Island in 1843, on his return from the Antarctic with the *Erebus* and the *Terror*, but that was not surprising, since he, like Cook, looked too far to the east. It was not until 1898 that it was rediscovered, this time by the German exploring vessel *Valdivia*, which searched for and found Bouvet Island, not in the position assigned to it, but some miles farther west, viz., in lat. 54° 26′ S., long. 3° 24′ E. Captain Krech found it steep and inaccessible, rising to a height of over 3,000 feet, and not more than five miles across at its widest part. A photograph shows it to be covered with a snow or ice cap. The *Valdivia* could find no other island in the vicinity. Since then there is no report of the island being sighted, and it must still be regarded as uncertain whether a second island exists. Probably the *Quest* will throw light on the problem. From what is known of the submarine relief of this part of the ocean, there is nothing improbable in the occurrence of a group of islands in the neighbourhood. A submarine ridge with water under 2,000 fathoms in depth seems to cover this part of the Southern Ocean.

[1] *Voyage of the "Discovery."* R. F. Scott. London, 1905, ii, p. 401.

[2] "Voyage of S.Y. *Nimrod*." J. K. Davis, *Geographical Journal*, December 1910.

[3] According to the *Geographical Journal* (February 1921), Captain Dixon, of the s.s. *Canadian Navigator*, in 1918 failed to find either the Nimrod Islands or Dougherty Island, although he was favoured by conditions of good visibility during his search. A marked increase in the number of birds and some kelp were observed to the west-south-west of the supposed position of the Nimrod Islands. These may possibly be indications of land in that direction.

This ridge is probably a branch of the great mid-Atlantic ridge, along which several volcanic cones rear their crests above the waters of the ocean.

Of these groups the most interesting is the little Tristan da Cunha group, of which several are well-known and one, Tristan da Cunha, is inhabited. An outlying, seldom-visited member of the group is Diego Alvarez or Gough Island. This island was a Portuguese discovery in the days of their great voyages to the East, but when Captain Gough in 1731 reported an island some degrees east of Diego Alvarez, the new discovery found a place on the charts as Gough Island, and it was long before the identity of the two islands was recognised. Being more or less on the route of sailing ships from the Atlantic to the Indian Ocean, this island was never lost sight of, but throughout the nineteenth century it was visited only by a few sealers and one or two warships from the Cape station. The visit of H.M.S. *Royalist* in 1887 resulted in a rough chart of the island. But practically nothing was known of its structure, fauna and flora, when in 1904 Dr. W. S. Bruce, on his return from the Antarctic in the *Scotia*, landed an exploring party. This visit resulted in many discoveries of scientific importance, but the exploration of the island is still incomplete.[1]

To return to the sub-Antarctic islands of the Southern Ocean—for Gough Island is temperate in climate and vegetation—there is one very isolated group that still awaits thorough examination. The South Sandwich group lying south-east of South Georgia, between the meridians of 26° and 28° W. and the parallels of 56° and 60° S., was first sighted in 1775 by Captain Cook. A subsequent visit in 1820 by Captain Bellingshausen accounts for the many incongruous Russian names on the chart of the islands. The group consists of some eight small volcanic islands, among which are several active volcanoes. In recent years these islands have rarely been visited, except by a few sealers and whalers. Stormy seas and apparent lack of good harbours make the task of exploration difficult. The whalers even avoid these waters.

It is unlikely that any further islands remain to be discovered in the Southern Ocean. Yet it is not impossible that east of the South Sandwich group, between it and Bouvet Island, the South Atlantic ridge may have a southern extension on the summit of which some tiny volcanic island may exist. On her northward voyage along the meridian of 10° W. in 1904, the *Scotia*, on one occasion in particular, met great flocks of seabirds, the presence of which in numbers is a fair indication of the proximity of land, but heavy weather and low visibility in autumn days prevented an adequate search.

[1] "Diego Alvarez or Gough Island." R. N. Rudmose Brown. *Scottish Geographical Magazine*, August 1905.

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Memory, and Its Improvement

By Robert H. Thouless, M.A.

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THE experimental investigation of the processes of remembering and forgetting is one in which advances have been made fairly continuously during the course of the last thirty years. My main purpose in the present article will be to call attention to the most recent developments, and to the aspects on which attention is focussed at the present day, and in connection with which important discoveries may still be made. In order to do this, however, it is necessary for the sake of completeness to mention work on the subject which is no longer recent. These parts of the subject I propose to mention as briefly as possible.

The person who is not a psychologist is mainly interested in one problem of memory—the question of whether or not the psychologist can tell him of any way by which his memory can be improved. This being the case, he will naturally be disappointed to find that the earliest contribution of empirical psychologists to the subject was the dictum of William James (often repeated since on no good experimental evidence) that his memory is not capable of improvement; that, although he may improve his methods of learning, or other factors incidental to the successful employment of his memory, his memory itself will remain as it was. The way that James states this fact is as follows: *No amount of culture would seem capable of modifying a man's* GENERAL *retentiveness.*[2] Later he calls this general retentiveness *the faculty for remembering facts at large.* The discouragement felt by the person who has spent valuable time and money on systems which advertised that they would improve his memory is only a little mollified by finding that he is further told that his remembering may be made better by improved methods of learning.

Yet the mere wording of this dogma carries in itself a warning to the psychologist impregnated with the modern point of view. The word *faculty* implies that we are thinking of the memory as a separate part of the mind with which we remember, just as the hand is a part of the body with which we grasp things, and the leg is a part of the body with which we kick or walk. For a long time psychologists did regard the mind as made up of such separate faculties of memory, imagination, etc., until it was understood that such faculties have no real existence, and are only results of the vicious habit of mind which takes words from

[2] *Principles of Psychology*, vol. i, p. 664.

popular speech and supposes that they stand for real things. The truth is that it is one mind which is at one time remembering, at another imagining, at another doing both of these at once, or performing some other combination of its numerous functions. We may still use the word *memory* as a convenient term for including all the mental functions which result in the recall of past experience, but *memory* as a faculty about which we can either assert or deny the possibility of its improvement by practice must be dismissed as a myth which modern psychological thought has outgrown.

Perhaps the force of the objection to this conception of the faculty of memory will be felt most strongly if we stop to consider the wide variety of mental functions which may be exercised when we remember. Let us take a few examples.

First, I will ask you to remember the date of the Battle of Hastings. 1066 jumps to your lips almost before you have had time to think. It is unlikely that you either saw or heard the date in your imagination, although some people would do so. What has happened is that a habit of repeating "Battle of Hastings, 1066" was so engrained in your mental constitution by constant repetition in your school-days, that the idea of the Battle of Hastings immediately causes the discharge of the appropriate motor response *ten sixty-six* without any intervention of a conscious process, except, perhaps, the very vague feeling of the muscular movements necessary to make the word.

Secondly, will you try to remember whether some familiar figure, let us say the clerk who usually attends to you at the bank, has a moustache? For those who are not ready visualisers this will be found to be rather a difficult operation. The method which we all adopt (if, as I am assuming, we have never particularly noticed whether he has one or not) is to call up a visual image of the person in question. This may be clear and distinct, or dim and vague, according to our powers of visualisation. We then try to see whether this image has a moustache, and, if our picture is too indistinct for us to be certain, we may experiment by trying to picture his face with and without a moustache, until we feel that we can recognise the image as a true representation. If, as a result of our inspection, we feel ourselves able to say confidently that the man has a moustache, we say that we have *remembered* this fact.

As a third example of remembering, we may take what remains of the present article in your mind twenty-four hours after you have finished reading it. It is improbable that it will have been entirely obliterated from your mind; in ordinary speech, you will say that what remains of it in your mind is the part you remember. If you try to see how much of it you can consciously recall at that time, you will find yourself going through a very different mental process from that involved in either of the two previous examples. You will, for example, probably be unable to recall any part of the visual experience of seeing the actual words of the article by means of visual images. If you can recall vaguely what the article looked like on the page, that will be no help to you in remembering it. Essentially you will be recalling the meaning of its different parts, and the logical connections between them. You may be able to do this quite successfully, even if you can remember none of the words of it at all, and if you succeed in doing this you will say that you remember the article.

We have, then, in three cases of remembering, three totally distinct kinds of mental activity, which we may at first be tempted to say have nothing in common except their name. What they have in common is, in fact, no psychological property, but the fact of practical importance only, that they all happen to be methods of discovering things about our past experience. The word *memory* owes its existence to the practical convenience of grouping together in speech all the mental activities used in the recall of past experience. The existence of the word does not justify us in supposing that all of these activities are in any psychological sense all of the same kind; still less does it justify us in supposing that there is some mysterious entity, *the memory*, about which we can make general statements such as the one which we began by criticising.

Of course, having decided that there is no such thing as a *memory*, we shall go on using the word very much as before. We shall still feel the practical convenience of being able to group together in speech all the mental activities connected with the recall of the past. But this preliminary discussion will have robbed the word of its power to mislead us, to make us believe that behind the *word* there is a *thing*.

This is not, as perhaps it sounds, a question of merely academic interest. It is one whose proper understanding will vitally affect our attitude towards all the practical problems of memory. We need not, for example, concern ourselves with the question of whether our memory itself, as distinct from the ways we have of remembering, is capable of improvement by exercise. It is seen to be a question devoid of meaning, for no such thing exists as a *memory* in the sense presupposed by the question. The distinction between the memory itself and other factors in the successful recall of past experience is invalid. These other factors are such things as: the attention we gave to the experience at the time of its happening, our methods of observation or learning, the imagery by

means of which recall takes place, and the organisation of the existing mass of knowledge into which the new experience is to be received. It is, to say the least, an open question whether all of these factors may not be improvable. If they are improved by our efforts, we have made our power of remembering greater; in other words, our memory can be said to have been improved in the only sense in which that phrase can ever bear any real meaning.

If all of this be admitted, the problem of improving the memory resolves itself into the problem of discovering how to improve our ways of remembering. A considerable amount of work in experimental psychology has been devoted to this question because of its importance in pedagogy. In the space at my disposal it will be possible only to give a brief outline of the discoveries which have been made, and of these I propose to discuss only those which have practical bearings. We may take each of the above four factors in turn and examine the grounds on which we may believe in its improvability.

Perhaps the most obvious of the variable factors which affect the efficiency of our memorisation of a task is the amount of attention we give to it. The variability of the factor of attention can be strikingly shown by the fact that the efficiency of learning is sometimes increased by such a distraction as an external noise. This is apparently because the presence of the distraction makes the learner concentrate more intensively on his task. The importance which we all attach to this factor is fully justified by the results of experimental work. An intense, fairly uniform and persistent concentration of attention is necessary for efficient learning. This can be secured partly by interest in the subject to be learned, or merely in the act of learning. In the learning of nonsense syllables, and to some extent in all learning by heart, this concentration of attention must take place by voluntary effort. The power of making such an effort effectively appears to be one which can be very much improved by practice. The effectiveness of the concentration can also be increased by due precautions as to the conditions of learning, e.g. by avoiding the making of such long sittings that fatigue is seriously interfering with the concentration of attention.

The investigation of memory has revealed two distinct types of learners whose essential difference is supposed to lie in the nature of their attention. These are rapid and slow learners. The first learns quickly and easily, is readily disturbed by outside distractions, and forgets quickly. The slow learner, on the other hand, settles down to his task with difficulty, learns slowly, is little influenced by distractions, but retains what he has learned better than the other. The difference appears to be that the rapid learner is able quickly to concentrate attention on one task to the exclusion of others, the slow learner adjusts his attention less quickly and less exclusively. They may be said to be respectively *intensive* and *extensive* in their attention. It is difficult to say that one of these characters is more desirable than the other, since clearly both kinds of attention are valuable, but in different situations and in different walks of life. A German psychologist, Meumann, has suggested that they are not mutually exclusive qualities, and that the most desirable type of attention is that which combines both. In this case, both intensity of attention and extensity should be independently trained in order to obtain the highest efficiency in learning.

In order to illustrate the contribution which laboratory study can make to our knowledge of efficient methods of learning, we may take the question of the *part* and the *whole* methods. This is now so generally understood that a very brief reference to it will suffice. The uninstructed person, required to learn a long poem by heart, adopts what is called the *part method*; he divides the poem into sections of such a length that he can conveniently learn one at one sitting, he learns these at successive sittings, and finally learns them combined. Experiment proves conclusively that, despite the wide prejudice in its favour, this is a very inefficient method. The alternative method, in which the whole poem is read through at each sitting a few times or only once until it is learnt, is found to require a smaller expenditure of time and to result in a more efficient memorisation. It is not difficult to see why this should be the case. There are many elements of waste in learning by the part method; the formation of unnecessary associations between the end of each verse and its beginning which must be unlearned when the verses are connected together, the greater number of repetitions of the earlier verses, and the inefficient distribution of the times of repetitions.

Of course, these conclusions must be applied practically with reasonable respect for the peculiarities of individual cases. Some persons find the task of facing the whole of a long poem at once so discouraging that the whole method ceases for them to be effective. This discouragement, however, should disappear if we can convince them that this is really the easiest way of learning it; and against this possibility of discouragement must be weighed the fact that this method is certainly less tedious than the alternative of repeating over and over again small sections of the poem. In addition, it would clearly be unwise to use the whole method in its simple form if the material we were trying to learn were of very unequal difficulty in its different parts, for the easier parts would receive an unnecessary number of repetitions. In this case, a modification of the whole method may be devised

in which the most difficult parts receive more frequent repetitions than the others.

This is only one way in which remembering can be improved by the use of better ways of learning. I will mention a few others without discussing them in great detail. That the deliberate intention to remember is a vital factor in effective learning is a fact which has forced itself on the notice of experimenters on memory; but it is so widely believed outside the laboratory that we need not dwell on it. It has also been proved that a given number of repetitions of the material to be learned spread over a considerable length of time is more effective than the same number crowded together. This is one reason for the superiority of the whole over the part method, for it is clear that this condition is better fulfilled in the former method. Moreover, it must not be forgotten that autosuggestion is a factor which may influence the effectiveness of our remembering. Confidence that we shall succeed in retaining what we are trying to learn is the best condition for successful retention, while an attitude of doubt and distrust of the powers of our memory tends to make retention unsatisfactory. *Probably it would be no exaggeration to say that, every time a person remarks that he has a memory like a sieve, he is knocking one more hole through its bottom.*

It was mentioned earlier that one direction in which we might look for possible improvements in remembering was in the employment of mental imagery. This is a problem which will take us further into the field of modern psychological interest. Unless they have been interested in psychology, few people will be found to have any idea of the enormous difference between the minds of various people in their content of imagery. It is easy and natural to assume that other people think and imagine in much the same way as we do. That this is not the case was proved first by Francis Galton, who questioned a large number of people about the power they had of representing pictures of things before their mind's eye. In this power of *visualisation*, or the employment of *visual imagery*, he found astonishingly wide variations. Some persons stated that they could see things in this way as vividly and distinctly as they could see things which were really present. Others (particularly, Galton noticed, scientific men) denied that they had any such power themselves, and refused to believe that other people had. As a result of his researches, Galton came to the conclusion that people could be divided into three classes: the *visiles*, who had such imaginary representations of things seen; the *audiles*, who had imaginary representations of sounds; and the *motiles*, who had imaginary representations of movements. Later research has, on the whole, confirmed Galton's conclusions, although it has shown that their explanation is not so simple as he was led to suppose. In particular, it has been shown that people generally differ in the kind of imagery they use in imaging words and in imaging actual things. It has also been shown that people are by no means constant even in the kind of imagery they use for actual objects. This may vary with the nature of the object. At the same time, it is found to be true that most persons use one kind of imagery more readily than others. If we say, for example, that a person is of the *concrete visual* and *verbal auditory* type, we mean that he habitually images actual things by means of pictures, while he images words by their sound.

These differences come out very clearly in memory experiments. If we study the methods by which different people learn nonsense syllables—the ordinary material for memory experiments—we shall find that a few of them recall the syllables by forming a visual picture. We discover that this is the way they are learning when we find that they tend to mistake words which look alike. We find also that they can reproduce the syllables backwards as easily as they can in their correct order, a very difficult task for people who learn by any other method. Others use auditory images. These learn most easily if the syllables are read to them, or if they may read them aloud. They tend to mistake letters which sound alike, and their learning is generally seriously disturbed by an external noise which would not disturb the visualiser at all. Most commonly of all, we find persons who learn the syllables by means of motor imagery. These pronounce the syllables to themselves, and recall them by the feeling of the movements of mouth and tongue which are necessary in order to say them. These find learning easiest if they are allowed to read the syllables aloud, though this is not necessary. On the other hand, their learning is always seriously disturbed if they are compelled to perform some action, such as whistling or rapid swallowing, which prevents them from making the muscular movements of pronouncing the words.

In most tasks various kinds of imagery may be used, though they are not all equally efficient. It is obvious that the visualiser is at an advantage in remembering visual impressions, the person with auditory imagery in remembering sounds. Even in the memorising of nonsense syllables, there are characteristic differences between the performances of people with different kinds of imagery. The person using visual imagery in such learning is found to be slower but to be more accurate in his reproduction and to be more certain than the person who uses the more common auditory-motor method of learning nonsense syllables.

These facts show how important is the question of whether any method of training can make it easier for

us to use a kind of imagery which is not our dominant one. This is not a question which can be answered with certainty at present, but all the indications of experimental work seem to point in the direction of an affirmative answer. For example, long-continued learning of nonsense syllables by reading aloud or to himself makes the subject of a memory experiment approach to the auditory-motor type. Meumann states that he began by being predominantly non-visual in his learning of verbal matter, but that he cultivated visual ideation to such an extent that he was able to learn with it as well as with auditory or motor imagery, and he found that his visual learning was slower but more sure. That training can influence one's imagery is assumed by those systems of memory training which give exercises in visualisation, requiring their pupils to practise the mental picturing of past scenes and the discrimination of the details of those scenes. We must wait, however, for more extensive experimental investigation of the subject before we can be sure of the effects of such training.

A knowledge of the difference between the ideational types also enables us to understand the difficulty which some persons have in remembering certain things, although they appear to have in other respects what we call a *good memory*. Meumann tells the story of a boy who was trying to draw a map of Greece. Although he studied the map carefully by looking at it, his reproduction was a mere shapeless blob. Meumann surmised that he was of the motor type, and made him trace the coast-line with his finger. The boy was then able to reproduce the map without difficulty.

The last factor to be remembered in efficient memorisation is the part played by the previous organisation of the mind in its reception of new material. New knowledge is better remembered when the mind receiving it is already stored with related ideas by means of which the new matter may be at once understood, assimilated, and brought into order. This is a factor in remembering which can certainly be made increasingly efficient. I suppose that the prime object of the education of children is to increase their power and ease of learning by such an increase in their mind of the number of ideas which are already assimilated and ready to be related to any new knowledge which comes along. Let us imagine that a child of fifteen who has received an ordinary school education, and another child of the same age who has learned to read, but is otherwise uneducated, are both presented with a simple account of some facts equally new to both of them. It will be found that the account will be much better retained by the educated child. This will still be true, if the account be of such a simple nature that, in reading it, the uneducated child is able to understand it perfectly easily in every part. The difference is due to the mass of related ideas in the mind of the educated child into which the new information can be fitted.

The question with which we started this discussion of memory was the question of whether psychological research gave us any hope of improving our memories. The answer seems to be very decidedly in the affirmative, despite the pessimism of William Jones. We have discussed four factors in remembering: the attention, methods of learning, the imagery used in remembering, and the organisation of the existing body of knowledge in our minds. It is certain that most of these factors are improvable, and it is probable that all of them are. And, when we realise that the faculty of memory as distinct from our methods of remembering is merely a myth of out-of-date psychology, we must conclude that the improvement of our methods of remembering is the improvement of our memory.

BOOKS RECOMMENDED

The Economy and Training of Memory, by H. J. Watts. (Edward Arnold & Co.)

Experimental Psychology, by C. S. Myers, chap. v. (Cambridge University Press, 2*s.* 6*d.*)

MORE ADVANCED

Textbook of Experimental Psychology, by C. S. Myers, vol i, chap. xii. (Cambridge University Press, 9*s.*)

The Psychology of Learning, by E. Meumann. English translation, New York, 1913. (D. Appleton & Co.)

Movement and Mental Imagery, by Washburn. (Houghton Mifflin Co., 1920, $1.75.)

The Life of a Radio-Element

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RADIO-ACTIVE elements differ notably from ordinary matter in that they lack permanence. The ordinary elements seem made for all time; not so the radio-elements. They change. Each has a life; of some it might almost be said they have a career.

A radio-element is usually defined as one which emits spontaneously a α- or β-particles. Atoms which emit these particles are said to disintegrate. The α is a particle of matter which is equal in weight to four hydrogen atoms, carries two charges of positive electricity, and is expelled from the centre of the atom with a velocity of about 20,000 miles per second. The β is a single charge of negative electricity (and

therefore has a negligibly small mass), which is expelled with a velocity which varies from about 50,000 miles per second to that of light itself. A radio-element lacks no property which is characteristic of an ordinary element. Its properties are exactly those to be expected from its atomic weight, and are indeed those it would have, were it not radio-active. The properties which are associated with the name "radio-active" are additional properties, extras. Lack of permanence, as we shall see, is one of these.

The study of radio-activity in the last twenty years has supplied experimental proof of the individual existence of the atom as a real unit in the structure of matter. (It is true that for more than a hundred years chemists have found it extremely convenient to postulate the existence of atoms, but it is only in our own day that the physicists have been able to demonstrate that atoms really do exist.) An element therefore consists of an assemblage of atoms. A radio-element differs from one which is not radio-active in that in a given interval of time, say a second, a definite fraction of the total number of its atoms happen to disintegrate. Each disintegrating atom expels either an α- or a β-particle and becomes in consequence an atom different from what it was prior to the act of disintegration, or, what is the same thing, from an atom that has not disintegrated. A radio-element consequently contains always two kinds of atoms, those that have disintegrated, and those that have not. Those that are unchanged comprise the pure radio-element which is known as the parent; those that have disintegrated comprise a new element known as the product. The product is perfectly distinct from its parent in physical and chemical properties, and can be easily separated from it by the ordinary methods of analytical chemistry. If now the product happens, like its parent, to be radio-active, a certain fraction of it will disintegrate per second to form its product, a third substance, and this body, if radio-active, will produce a fourth, the fourth a fifth, and so on, till a body is reached which has not the power of disintegrating, when the series of elements abruptly ends. Such a series is called a disintegration series, and three of these are known at the present time. In a disintegration series each element but the last is the parent of the one that follows, and, except the first, the product of the one that precedes. The first body, the head of the series, is called a *primary* radio-element, or sometimes the original parent. Uranium and thorium are two of the three primary radio-elements.

It must be pointed out that a radio-active body never disintegrates "all at once." The process may proceed quickly or slowly according to the properties of the element disintegrating, but it always proceeds according to one settled plan. In a given interval of time there is always a definite fraction of the atoms of each radio-element which disintegrate, and this fraction is invariable. It is the same whether there be a million million atoms present or a million only; no chemical combination with other atoms—or physical agency such as change of pressure or of temperature—seems able to affect the value of this fraction in the least degree. The fraction for the best known radio-element, radium, is $\frac{1}{2309}$ per year. This means that if we were to weigh out 2,309 pounds (or any other unit of weight) of radium to-day, in a year's time 2,308 would remain absolutely unchanged and 1 would represent the weight of products into which the radium had disintegrated. Expressed otherwise, 99·95 per cent. (if you work it out) of the radium fails to show any sign of radio-activity in the course of a year, so that the radio-activity of radium is due to a very small percentage of itself. Most radio-elements disintegrate more rapidly than radium; five disintegrate more slowly.

Let us now consider the matter more in detail. Suppose a body disintegrates so rapidly that time may be conveniently reckoned in days instead of in years. We shall imagine that the fraction which disintegrates each day is 10 per cent. It must not be deduced from this that the whole of the body will consequently disappear in ten days. The percentage that disintegrates each day is calculated on the actual number of atoms of the radio-active body in existence at the beginning of that day. Let there be 1,000,000 atoms at any particular time, then exactly a day later there will be 900,000, after two days 810,000, after three days 729,000, after four days 656,100, after five days 590,490, after six days 531,441, and after a week 478,297. Each of these numbers is 10 per cent. less than the number which precedes it. All radio-elements, when pure, disintegrate according to a scheme of this kind. The fraction that disintegrates daily varies enormously for the different elements, but for each element, as has been said, it is invariable. For equal intervals of time (in the example, one day) the ratio of the number of atoms of the original radio-element at the end of the interval to that at the beginning is constant (in the example $\frac{9}{10}$). This is the law of disintegration which governs all known radio-active changes. It is sometimes stated in this form: as time *increases* in *arithmetical* progression, the number of atoms *decreases* in *geometrical* progression. In Fig. 1 the type of curve obtained by plotting the number of atoms (or the activity) against the time for the radio-element uranium X is shown. It is known as a decay-curve.

There are two interesting consequences of this law which are not obvious, but which will nevertheless be mentioned. The first is that, although the number of atoms comprising the radio-element change with

time, an atom *may* exist unchanged for any time from zero to infinity. There is, however, for each radio-element an "average life" of so long and this in years, days, hours, etc., is numerically equal to the reciprocal of the fraction that disintegrates per year, per day, per hour, etc. The second is that for each radio-element there is a constant interval of time at the end of which the number of atoms, at its beginning, has fallen (through disintegration) to half. This is called the half-value period, and is the unit in which the life of a radio-element is most often expressed. Between the fraction disintegrating, the "average life," and the half-value period are simple numerical relations; the reciprocal of the fraction disintegrating is the "average life," and that multiplied by the factor 0·693 is the half-value period. In the example above the fraction disintegrating is $\frac{1}{10}$th per day (10 per cent.). The "average life" of the atoms is 10 days; the half-value period 6·93 days. In this last period the million atoms become 500,000, in 13·86 days 250,000, in 20·79 days 125,000, and so on. The fraction for radium is $\frac{1}{2309}$ per year; the "average life" of radium atoms is 2,309 years, the half-value period 1,600 years. If an ounce of radium had been separated from its ore about 1279 B.C. it would have weighed half an ounce in 322 A.D., and a quarter of an ounce to-day, and this weight will fall regularly by half every 1,600 years so long as the universe continues.

Thorium has the longest half-value period of all, 15,000,000,000 years; uranium comes next with a third of this amount. These are enormous and almost unthinkable periods of time. Three bodies have periods reckoned in hundreds of thousands of years. Next comes radium, with a period of a thousand years or so, and next actinium, with twenty years—the only radio-element whose period approximates to the life of man. Most radio-elements have periods less than a year, and some are very short indeed; that of the element known as thorium A is ·14 of a second, so that in seven times that period (a second approximately) the amount of this element falls in the ratio of 128 to 1. Thorium A consequently has a short life, but, no doubt, a merry one. Yet it is long compared with that of the element thorium C, whose period is ·00000000001 of a second. It is only right to add that this short period has not been measured directly; it is calculated, however, from trustworthy evidence. The shortest period directly measured is that of actinium A, a mere five-hundredth of a second!

It may well be asked how it is, if the world be old and the half-value periods of most radio-elements short, that these bodies exist at the present day at all. To this, in short space, it is not easy to make reply. Consider, first of all, the long-lived primary elements, thorium and uranium. They are rare elements, becoming as time goes on still rarer. For, although the process of disintegration is exceedingly slow, there is no evidence of the existence of a compensating influence on the earth by which these elements, by being built up from others, might be maintained at their present amount. Yet the periods are so very great that it is not to be wondered that these elements have persisted on earth so long. Compared with the lifetime of a man they may be almost exactly described as not changing at all.

Consider next uranium and its product, the body known as uranium X. The latter is easily separated from the former by simple chemical means. Let us

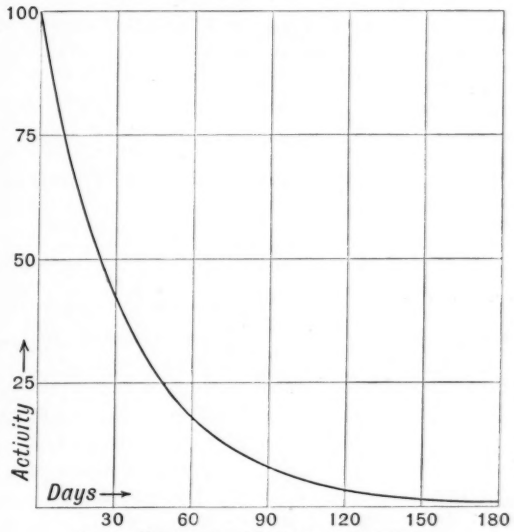

FIG. 1.—THE DECAY-CURVE OF URANIUM X.

consider a preparation of uranium from which the whole of the uranium X has recently been separated. Uranium disintegrates, and for every atom which disintegrates an atom of uranium X is produced. It is clear that, if uranium X were not radio-active, it must accumulate with time in the preparation of uranium. Actually, however, it is radio-active, disintegrating to form a third body; consequently it does not accumulate beyond a certain point, for there comes a time when the number of atoms of uranium X produced by the atoms of uranium is exactly that which disintegrates to form the third body. After that time has been reached the quantity of uranium X remains constant. The *quantity* remains constant, but the atoms comprising the material do not remain unchanged, for two things are happening. Some atoms are disintegrating to form the third body and as many others are taking their place from the disintegration of uranium. When this occurs uranium X is said to be in equilibrium with its parent uranium.

These facts have an interesting consequence. If uranium X be completely separated from uranium it will disintegrate away according to the law that has been described above, but as fast as it disappears, when alone, it is grown from its parent uranium, the growth continuing until equilibrium is again reached. A few figures may make this clearer. Suppose 100 to represent the weight of uranium X in equilibrium with a given quantity of uranium. Then at the moment of separation of the former from the latter, which we shall call zero-time, the former preparation contains 100 units of uranium X, the latter none. The amounts found experimentally at subsequent times are set out in the table below:

Time in days.	Amount of uranium X in the uranium X preparation.	Amount of uranium X in the uranium preparation.
0	100	0
1	97·18	2·82
$24\frac{3}{5}$	50·0	50·0
$49\frac{1}{5}$	25·0	75·0
$73\frac{4}{5}$	12·5	87·5
$98\frac{2}{5}$	6·25	93·75
123	3·125	96·875
$147\frac{3}{5}$	1·562	98·438
$172\frac{1}{5}$	0·781	99·219
369	0·003	99·997

Note that there are always 100 units of uranium X in existence; whatever part is lost by disintegration of uranium X is made up by disintegration of uranium.

The curves obtained by plotting these two sets of results against the time are shown in Fig. 2, and are called decay- and rise-curves respectively.

A radio-element, therefore, appears to have a life only when it is away from its parent. Separate it from it and no power that is known can arrest or influence its rate of disintegration. But if it be with its parent, and equilibrium has been reached, the amount of it is constant, or it will only vary directly as does the amount of its parent. A product with its parent therefore appears to have the same life as its parent.

The fraction of the product that disintegrates per second has, however, a bearing on the matter. It cannot affect the *life* of the product when it is with its parent, but it does affect the *weight* of the product in equilibrium with a given weight of the parent. It is found that these weights are to one another in the same ratio as their half-value periods, and this result holds equally whether we consider a parent and its product or the parent and its product's product, or its product's product's product, etc. This is a very important and useful result. For example, the amount of uranium X in equilibrium with one kilogram of uranium is $\frac{24{\cdot}6 \times 1{,}000 \times 1{,}000}{5{,}000{,}000{,}000 \times 365}$ milligrams, since 24·6 *days* and 5,000,000,000 *years* are the periods of the two bodies respectively, and since there are 1,000 milligrams in a gram and 1,000 grams in a kilogram. This result when evaluated is 0·000013 milligram. So with radium, which is uranium X's product's product's product's product. The amount of radium in equilibrium with one kilogram of uranium may likewise be evaluated as 0·34 milligram. And so for other bodies. The longer the life of a radio-element the more there is of its weight in a preparation which contains the original parent. And the converse of this holds true also. In a mineral containing uranium and (as the majority of such minerals do) all its successive products, if the amount of pure uranium contained in it be determined, and the amount of radium be separated and determined, then if the period of uranium be known that of radium can be calculated, and *vice versa*.

There are about four principal methods of measuring the life of a radio-element, three of which may be described in outline. The first is to count the actual number of α-particles emitted each second by a known weight of the disintegrating material. Each α-particle that strikes a specially prepared screen gives a flash of light, and the number of flashes may be counted with a microscope by an observer in a dark room. In this way the number disintegrating may be obtained. Now the number of atoms in any given weight of this element is known. Divide the number of atoms that break up per second in a given weight by the total number of atoms in that weight, and the fraction disintegrating per second is obtained. In this way the period of radium may be measured.

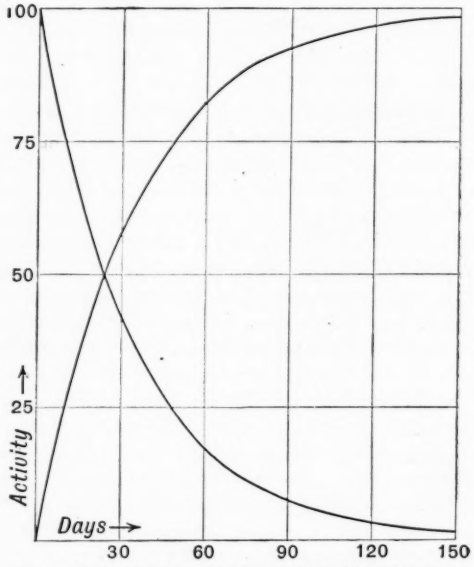

FIG. 2.—THE DECAY- AND RISE-CURVES OF URANIUM X.

A second method is to separate out and purify (if you can) and weigh the quantity of a radio-element

associated with a known quantity of the primary radio-element. If the weights of both and the period of one is known, then, as was mentioned above, the period of the other may be simply calculated. In this way the period of uranium has been obtained.

The commonest method, however, is to measure the radio-activity of a preparation at intervals in a special apparatus called an electroscope. From these observations it is not difficult to evaluate the half-value period or the period of average life. This is the chief method of measuring the periods of those bodies that lie between a few minutes and a few years, the majority of the radio-elements.

REFERENCES

Radio-active Substances and their Radiations. By Sir E. Rutherford, LL.D., F.R.S. (Cambridge Univ. Press, 1913, 16*s.*)
Radio-activity and Radio-active Substances. By J. Chadwick M.Sc., Ph.D. (Sir Isaac Pitman Sons, Ltd., 1921, 2*s* 6*d.*)

Horse-Racing and Magic under the Roman Empire

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AMONG the records of antiquity preserved in the great collections of Greek and Roman inscriptions there is a series of very human documents. The writing, with which they are covered, betrays as a rule their humble origin. They frequently contain mistakes of grammar and spelling, and the latter, upon occasion, throw an interesting light upon the pronunciation of their day. These documents consist of small sheets of lead inscribed with magical spells which have been inserted into graves or nailed to the walls of tombs.

Whether this practice was of oriental origin is not certainly known. It took firm root in Attica in the fourth century B.C., and spread thence with Athenian trade to Italy. The Romans adopted the superstition and carried it into the provinces of the West. In Roman Africa, the home of Apuleius (born about A.D. 125), the author of *The Golden Ass*, who was himself put upon trial upon the charge of magical practices, this, like all other magical arts, found a congenial soil. The African temperament, alike in literature, philosophy, and religion, was naturally inclined to exuberance and mysticism, an influence from which the Christian Fathers of African origin are not exempt. It is from this province that the document before us derives; it was found in the tomb of an imperial official near the site of Roman Carthage. It consists of a small sheet of lead roughly 5½ inches long; a series of cabalistic signs are inscribed round the borders, within which is written the Greek text.

The object of placing spells of this character in graves or of nailing them to the walls of tombs was to open up direct communication with the powers of the nether world. Sometimes the spirit of the dead man, whose grave is utilised, is itself compelled by the magic of the great names to carry out the terms of the spell. Another similar African inscription of the third century thus begins: "I conjure you, whoever you are, spirit of the dead man." A favourite place for the deposition of spells affecting the games was the *spoliarium*, or mortuary in which the dead bodies of gladiators were laid.

The inscription opens with a series of "words of power": *Semesilam damatameneus lesnnallelam·laikam ermoubele iakoub ia ioerbeth iopakerbeth eomalthabeth allasan.* Mystic words of invocation are a common feature of these conjurations. They are equally frequent in the magical papyri of the third and fourth centuries after Christ, and in the superstition of mediæval Europe. In magic a natural premium is set upon the strange and the unknown, which itself has an impressive because unintelligible sound, significance, or appearance. The general characteristics of such formulæ, whether they are found in the classical inscriptions or in the records of English folk-lore, are fairly uniform. Some are taken from foreign or strange religions. The magical inscriptions and papyri for this purpose drew largely upon the religions of the Jews and the Egyptians. Thus in the formula before us we have Ia and Iakoub; and forms of Iahwe and El, the two names of the Deity in the Old Testament, are favourites both by themselves and in their compounds. Thus another formula opens, Iao El Michael. Other formulæ consist of corruptions of names or words, e.g. the mediæval *hocus pocus*, which is an ignorant corruption of the words of the Mass, *hoc est corpus meum*, "this is my body." Of this kind is *damatameneus*, which appears to be a corrupt form of Damnameneus, who was one of the pygmy magicians (Idæan Dactyls) of ancient Greek folk-lore. Other formulæ, again, are simply arbitrary gibberish, sometimes an arrangement of mystic letters, as for instance a combination of the vowels which was very popular (e.g. *eueuiæeia oeianiuaieo* [1]) or sonorous nonsense words which often have an oriental or Egyptian looking termination in *beth* or *oth*. Compare, for example, the formula of an English charm against thieves quoted by Reginald Scot, which runs: "Drochs myroch esenaroth betu baroch ass maaroth." [2]

[1] In the magical papyrus discussed by Dieterich, *Eine Mithrasliturgie*, p. 4.
[2] Scot, *The Discovery of Witchcraft*, Booke XII, cap. 18.

"The spell. I conjure you by the great names that you bind every limb and every sinew of Victoricus, whom Earth the Mother of all living things bare, the Blue charioteer, and his horses which he is going to drive, Juvenis and Advocatus and Bubalus belonging to Secundinus, and Pompeianus and Baianus and Victor and Eximius belonging to Victoricus, and Dominatus belonging to the Messalas, and any others which may be harnessed with them."

MAGICAL TABLET FROM A TOMB NEAR CARTHAGE.

The object of the spell is to prevent Victoricus, the charioteer of the Blues, winning the races in the circus. The passion for racing, which existed in imperial Rome, is notorious, and the provincial towns in this imitated the capital. There were four competitive factions or parties, whose colours were white, red, green, and blue. In the contests of their representative charioteers every individual was passionately interested. At the end of the first century after Christ, Martial, the poet, complains that, as a topic of conversation in polite society, literature cannot compete with the latest news of the betting upon Scorpus, a charioteer, who died when only twenty-seven, and is recorded to have earned in one hour fifteen purses of gold. According to Juvenal (the contemporary satirist), a charioteer of the Reds earned a salary roughly a hundred times that of the most successful barrister. Betting was heavy; but, apart

from the money at stake, everyone was also a passionate partisan of his particular colour. Emperors themselves were known to abuse their power in the interests of their faction, and Caligula, an ardent Green, was accused of poisoning the horses of the Blues. "A party cry was supplied to the populace, which could not understand horses and racing, but could always rally to the meaningless colours. Nero or Marcus Aurelius might be master of the world, the Empire might be at peace or tottering in civil war and insurrection, the barbarians on the frontiers advancing or driven back; at Rome for high or low, free or slave, men or women, Green and Blue was the one theme of anxiety and hope." [1] So intense was the rivalry that riots between the factions were frequent; the most notorious are those which took place in the Circus of Constantinople in A.D. 552, in which 30,000 people were killed, and the Emperor Justinian but narrowly escaped the loss of his life and throne.

Returning to our text, the curious phrase after Victoricus' name is to be explained by magical usage. Individuals in these spells are invariably denoted by their mother's name, and not by a patronymic, because it was of the first importance that there should be no mistake as to the objective of the spell. "It is a wise child," says the proverb, "who knows his own father," but about the mother there can be no physical doubt. In this case, however, the author of the spell was evidently ignorant of the name of the mother of Victoricus, and was obliged, for formal completeness, to refer his ancestry to Earth, the mother of all things. The names of the horses and their owners are specified, and to provide for contingencies a general clause is added in case some other animal from the Blue stables is actually run. Horses were usually given "lucky" names indicative of desirable qualities or success. Thus in our list Juvenis suggests youthful vigour; Advocatus, trusty help in time of need; Bubalus, the swiftness of the gazelle; and Eximius, excellence; while Victor, Dominatus or Dominator, and Laureatus [2] (crowned with laurel) are associated with victory. It was a horse called Victor owned by a certain Gutta Calpurnianus, which held the amazing record of 429 victories in the circus at Rome. To have won a hundred races earned a horse the title of Centenarius and special trappings. The names Pompeianus and Baianus are connected with the horses' origin. The first may indicate that the horse was reared at the place Alba Pompeia, or possibly that it came from the stud of a man called Pompeius. Baianus probably refers to Baiæ near Syracuse. In the fifth century B.C., in the time of Æschylus and Herodotus, Sicily was already famous for its horses. Under the early Roman Empire enormous stud farms were developed in the island to meet the constant demands of the circus, and "when Gregory the Great was selling off the horses on the property of the Church in Sicily, a mere four hundred that were to be left seemed too inconsiderable to take into account." [3]

"Bind their legs and their motion and their leaping and their running, dull their eyes that they may not see, twist their souls and their heart that they may not breathe. As this cock is bound feet and hands (*sic*) and head, so bind the legs and hands and head and feet of Victoricus, the Blue charioteer, to-morrow and the horses which he is going to drive, Juvenis and Advocatus and Bubalus and Lauriatus belonging to Secundinus, and Pompeianus and Baianus and Victor and Eximius belonging to Victoricus, and Dominatus belonging to Messala and any others which may be harnessed with them."

The deposition of the spell was evidently accompanied by the magical binding of a cock, the object of which was to effect upon the familiar principle of sympathetic magic a similar "binding" of Victoricus and the horses. We may compare a passage in a Latin magical tablet which runs: "In the same way as I have twisted out and nailed down the tongue of this living cock, thus may the tongues of my enemies be silenced towards me." Narrative charms work upon the same principle of like causing like, the narrative taking the place of imitative action. Thus, headache may be driven away by reciting how Headache met Jesus upon the seashore, and Jesus ordered him to go off into the wilds and enter into the head of a bull.[4]

"Further, I conjure you by the god of the upper heaven, who is seated above the Cherubim, who hath put boundaries to the land and separated the sea, iao, abriao, arbathiao, adonaï sabao, that ye bind Victoricus the Blue charioteer and the horses which he intends to drive, Juvenis and Advocatus belonging to Secundinus, and Pompeianus and Baianus and Victor and Eximius belonging to Victoricus, and Dominatus belonging to Messala, that they may not arrive at victory to-morrow in the circus. Now! Now! Quickly! Quickly!"

The words of power here employed again show the use which the magic of late classical times made of Jewish religion and the Septuagint. *Adonaï* and *Sabaoth* are favourite divine names for such use throughout the Middle Ages. *Iao*, it will be noticed, is followed by arbitrary compounds without meaning—*abriao, arbathiao.*

[1] Friedländer, *Roman Life and Manners under the Early Empire*, vol, ii, p. 29.

[2] See below. The name is omitted by mistake in the first list of Blue horses.

[3] Friedländer, op. cit., p. 25.

[4] Pradel, *Griechische und Suditalienische Gebete, Beschwörungen und Rezepte des Mittelalters*, pp. 15–16.

The spell concludes like many of its class upon a note of urgency, and ends with what is a usual formula to compel the powers invoked to get at once to work. The rest of the story is lost. We do not know whether Victoricus and his horses were smitten in the night with mysterious illness, or whether the Blues won a victory upon the following day. The event, of such desperate moment to the writer of this spell, assumes across the ages its relative unimportance in the scheme of things. It is this vision of the futility of the immediate motives of human passion which lend these documents their pathos. In the almost untranslatable words of the poet Vergil, the greatest of those who have been accounted masters of magical lore,

"Sunt lacrimæ rerum et mentem mortalia tangunt."[1]

The sketch of the tablet is taken from *Corpus Inscriptionum Latinarum*, viii, 13511. A text and notes will be found in Wünsch, *Antike Fluchtafeln*, 2nd ed. (Bonn, 1912), pp. 9–13. *Inscriptiones Græcæ*, iii, 3, edited by the same scholar, contains a collection of all similar tablets which had been found in Attica and elsewhere before 1897.

The Economic Position in Germany

By J. Ellis Barker

For many years the Germans have asserted that Germany was naturally one of the poorest countries in the world, that the extraordinary development of the national prosperity was due partly to the excellence of the German government, and partly to the industry and ability of the inhabitants. The statement that Germany is a poor country, though it was readily accepted abroad, is not in accordance with the facts. Germany, far from being naturally a poor country, is undoubtedly by far the wealthiest land in Europe. She enjoys great advantages for the pursuit of agriculture, commerce, and industry, although she has neither the genial climate of France and Italy nor the numerous harbours of England.

All North Germany is a level plain. One can travel from Cologne to the eastern frontier of Germany without passing through a single tunnel or important cutting. Level ground is ideal for the pursuit of agriculture. Moreover, Germany's soil is very fruitful, the climate is moderate, and the country does not suffer from the droughts which so frequently prove injurious in France and Italy. By the provision of nature, Germany produces an abundance of potash and other important chemical fertilisers.

The development of both agriculture and industry depends largely on an efficient and cheap transport system. Germany possesses the finest system of inland waterways in the world. The country is opened up by a number of deep and gently flowing rivers, which are navigable for very large boats for hundreds of miles, and they can easily be connected at comparatively small cost by lateral canals. The Rhine is navigable up to the Swiss frontier, and the Elbe up to the Danubian lands. As all North Germany is a level plain, railway construction was exceedingly cheap. The great success of the State railways was due not so much to the ability of the officials who managed them as to the fact that practically the whole of the Prussian State railways were built on a level plain, while the railways of France, England, Italy, and other countries had to overcome great natural difficulties.

Industrial prosperity depends nowadays on the possession of an abundance of cheap power with which machinery may be set in motion, and on an abundance of minerals required in industry. Previous to the war Germany possessed far more coal than all the other countries of Europe combined. Germany's coal is of excellent quality. It can be produced cheaply owing to the nature of the seams, and it is exceedingly rich in all those precious by-products which are more valuable than the fuel itself. In addition to an extraordinary wealth in coal, Germany possessed a superabundance of iron ore, zinc ore, and various salts, among which potash has attracted particular attention. About half of the country stands on a bed of salt. At some points bore holes have been sunk through 6,000 feet of solid salt without coming to the end of the deposit. With the continued progress of chemical science these salt deposits will prove of immeasurable value. Germany has vast stores of brown coal, or lignite, and of peat which can be made and are being made to yield cheap power, and the upper reaches of the rivers can produce millions of hydro-electrical horse-powers.

The development of commerce in a country depends on its productive capacity and on its geographical position. The German manufacturing industries and the German coalfields can furnish vast quantities of exportable goods. Moreover, commercial development is greatly promoted by Germany's central position in Europe and by her great rivers. Much of the land-locked and ice-locked trade of Russia goes habitually via the German harbours. Before the war a large part of Austria's foreign trade was carried by way of the Danube and of Hamburg, which was more important as a harbour to the Dual Monarchy than Trieste; and a large portion of the trade of Switzerand, Northern Italy, and Eastern France was carried by way of the

[1] Vergil, *Æneid*, i, 462: "Tears are to human sorrows given, hearts feel for mankind." (Bowen.)

Rhine. By its geographical position, Germany occupies a situation comparable to that of Holland and Belgium in relation to Central Europe, or to Liverpool, Cardiff, and Bristol in the comparison with England.

The war has led to a serious reduction of Germany's area, population, and natural resources. The country has lost the bulk of its iron ore and of its zinc, and also vast quantities of coal and potash, to the victors. Still Germany remains by far the wealthiest country in Europe. She retains her level soil, excellent climate, her central situation in Europe, and her excellent inland waterways; and, notwithstanding the loss of Upper Silesia and of the Saar field, she retains her old pre-eminence as a coal owner among the European nations, as the following figures show:

—	Position in 1914.	Present Position.
	Tons.	Tons.
Germany	424,000,000,000	235,000,000,000
Great Britain	189,000,000,000	189,000,000,000
European Russia	60,000,000,000	57,000,000,000
France	18,000,000,000	31,000,000,000
Belgium	11,000,000,000	11,000,000,000
Holland	4,000,000,000	4,000,000,000
Poland	—	208,000,000,000
Other countries	78,000,000,000	49,000,000,000
	784,000,000,000	784,000,000,000

Germany has still considerably more coal than the United Kingdom, and the position of her coalfields is most favourable. The greater one lies on the Rhine and the lesser one in Upper Silesia. The manufacturing industries habitually settle about the coal pits. The Ruhr coalfield facilitates the coal export trade and industrial exports across the sea and towards Western and Central Europe, while the eastern coalfield is particularly well situated with regard to Russia, the East European countries and the Danubian lands. All the Continental countries, excepting Poland, remain comparatively poor in coal. The coal seams of France in particular are thin and exceedingly irregular, which means that French coal will remain scarce and dear if compared with German coal. Moreover, while Germany has most excellent coking coal, France has, both in her old coalfields and in the Saar measures, little coal suitable for iron smelting. Iron ore is habitually conveyed to the coalfields for smelting purposes. The iron ore of French Lorraine, Sweden, and other countries, will continue to be sent cheaply by waterways to the Ruhr coalfields to be smelted. Germany seems likely to retain her old pre-eminence in the iron and steel and engineering industries, as the following figures, taken from the *Iron Trade Review of Cleveland, Ohio*, show:

Pig Iron Production

—	1913.	1920.	1921.
	Tons.	Tons.	Tons.
United States	30,600,000	36,401,000	16,750,000
Germany	19,000,000	6,500,000	7,500,000
Great Britain	10,260,000	8,007,000	2,700,000
France	5,126,000	3,275,000	3,200,000
Belgium	2,428,000	1,112,000	825,000
Luxemburg	420,000	685,000	960,000
Central Europe	2,343,000	870,000	965,000
Other countries	6,517,000	3,786,000	3,060,000
	76,694,000	60,636,000	35,960,000

Steel Production

United States	31,300,000	42,100,000	20,100,000
Germany	18,631,000	8,000,000	9,000,000
Great Britain	7,664,000	9,057,000	3,700,000
France	4,614,000	2,915,000	2,900,000
Belgium	2,428,000	1,216,000	760,000
Luxemburg	918,000	590,000	760,000
Central Europe	2,584,000	1,225,000	1,500,000
Other countries	6,490,000	3,218,000	2,011,000
	74,629,000	68,321,000	40,731,000

Before the war Germany produced approximately as much iron and steel as all the other countries of Europe combined, and more than twice as much iron and steel as this country. In 1921 Germany's pre-eminence in Europe was very nearly as great as it was during the pre-war year.

The prosperity of the manufacturing industries in general, and of those industries in which coal is an important factor, such as the engineering industries, the chemical industries, earthenware, china, and glass works in particular, depends very largely upon the price of coal. In this respect Germany has an extraordinary advantage over Great Britain, France, and other countries in which coal is far more expensive than in Germany. Coal prices are fixed from time to time by the German Government. In December 1921 they were established as follows for the principal qualities:

	Marks per ton.
Mine run rich coal	405·10
Best mixed rich coal	455·00
Lumps rich coal	533·50
Nut rich coal, highest quality	545·50
Coking rich coal	413·20
Mine run gas coal	460·40
Nuts, gas coal, highest quality	545·50
Mine run meagre coal	401·20
Lumps, meagre coal	548·20
Best nuts, meagre coal	599·40
Best anthracite nuts	696·70

The prices given are inclusive of the German coal tax of 30 per cent., and the German tax on turnover. At the time when these prices were fixed, the German exchange was above M. 1,000 to the £. It follows that German coal was to be sold at about 10s. per ton at the pit's mouth.

The German industries have a great advantage over the industries of Great Britain and of other countries, not only owing to their being able to obtain excellent coal at prices which seem inconceivable over here, but also owing to the fact that wages are far lower in Germany than in this country, in the United States, in France, Switzerland, and elsewhere. Before the war a substantial day wage for hard-working men, such as a miner, was M. 5 in Germany, which then was equal to 5*s*. Now miners and other hard-working and well-paid men receive about M. 80 per day, which at the current rate of exchange is equivalent to about 2*s*. However, it should not be thought that German real wages have declined to less than half the pre-war rate. According to the statistics published by the German Government, living expenses have increased from 100 previous to the war to 1,397 in November 1921, when very high prices were reached. In other words, the cost of living had increased only fourteen-fold, although in November 1921 the cost of the pound sterling in German money had increased fully fifty-fold. While the cost of living had grown fourteen-fold by November 1921, wages had increased approximately sixteen-fold, as in the case of miners, whose earnings have been advanced from M. 5 to M. 80. There is a vast difference between the foreign and the internal value of the German mark.

The cost of living in Germany has been kept extremely low owing to the Government's policy. Large subsidies have been granted to cheapen food. The limitation of rents causes the workers to live practically rent-free, for a rent of M. 10 per week is equal only to a few pence in English money. Fares and freights are kept exceedingly low, because the State railways are run at a gigantic loss. Taxes, however and upon whomsoever imposed, are borne by the masses as a whole in the form of increased prices. Taxation is exceedingly low in Germany if compared with taxation in Great Britain. Germany's revenue from April 1, 1921, to the end of the year came to M. 51,665,295,000. At M. 750 to the £ that sum is equal to £75,000,000 in round figures, and the revenue for the whole year may come to M. 70,000,000,000, which would be equivalent to £105,000,000 at the rate mentioned, and to £140,000,000 at the exchange of 500 marks to the £.

German industry and commerce are prospering at the cost of Germany's finances. Between April 1 and December 31, 1921, Germany's national expenditure came to M. 132,360,574,000. Of this sum only M. 51,665,295 was covered by revenue, while M. 80,592,363,000 was found by increasing the floating debt of the country, which had rapidly risen to M. 246,921,550,000 at the end of last year. The floating debt consists partly of bank-notes and partly of treasury bills which are discounted with the banks and which must be renewed from time to time. The stock of bank-notes in circulation has increased as follows since pre-war times:

	Marks.
June 10, 1914	2,407,000,000
December 31, 1914	5,046,000,000
,, 1915	6,918,000,000
,, 1916	8,055,000,000
,, 1917	11,468,000,000
,, 1918	22,188,000,000
,, 1919	35,698,000,000
,, 1920	68,805,000,000
,, 1921	113,639,000,000

We cannot wonder that the value of the mark has declined very severely in view of the gigantic increase of the bank-notes in circulation. There is considerable danger that, at some time or other, the banks, alarmed by the financial recklessness of the Government, may refuse re-discounting the treasury bills which fall due. In that case the Government would have to repay the banks in cash, which means in bank-notes. The note printing press would be set in motion with the utmost energy, and the consequence might be the complete collapse of the German currency. It is significant that the great increase in the note circulation took place, not during the war, but after its conclusion.

The new men who came into power in consequence of the revolution tried to make themselves and the new régime popular by increasing wages and salaries, granting subsidies and doles, and keeping taxation low. They endeavoured to create an atmosphere of prosperity by means of the printing press, and by running more and more deeply into debt. The régime of inflation has been fatal to all who live on fixed incomes. Many of those who formerly were rich or well-to-do have been utterly ruined. Also the cash savings of millions of thrifty men and women deposited in the savings banks or placed in small bonds have been reduced to a trifle. Naturally millions of thrifty and conservative men have been embittered by the robbery practised upon them, and among the most conservative people a spirit has been raised which at some time or other may prove exceedingly dangerous to the democratic form of government in Germany. The dilution of the currency has enriched all the debtors by reducing their debts to a mere fraction. It has transferred millions from the thrifty to the thriftless.

The inflation of the currency has created a gambling mania throughout Germany, and has led to the most reckless speculation, which is the usual result of currency dilution. All business has become a gamble. An ordinary commercial transaction may result in a huge unexpected profit owing to a sudden change in the value of the currency, or may bring about a ruinous unexpected loss. Gambling in foreign exchange, in stock exchange securities, in land and houses, and in goods of every kind has taken unprecedented pro-

portions. Banks and stockbrokers are overwhelmed with speculative business, and two important provincial banks have been ruined by illegitimate exchange speculation undertaken by their officials. A veritable orgy has taken place in the field of company promotion. In 1913 shares of the nominal vaule of M. 635,000,000 were issued in Germany. In 1921 share issues came to M. 19,229,000,000, or were more than thirty times as large as during the pre-war year. In 1916 the share capital of all the German companies came to M. 16,000,000,000, in 1919 it stood at M. 20,300,000,000, in 1920 it reached M. 29,000,000,000, and in 1921 it arrived at M. 54,700,000,000. Many companies have doubled, trebled, and quadrupled their capital.

Germany's post-war prosperity has been built up on the treacherous basis of unsound finance. Inflation is always followed by deflation. Every boom leads to a slump, and the wilder the advance has been, the more terrible will be the crash. England and the United States have suffered severely from the reaction which followed a relatively unimportant currency inflation and boom. The unparalleled expansion of business in Germany and the extraordinary advance in prices are bound to be followed by an unparalleled crash and ruin. Meanwhile Germany seems highly prosperous. In 1913 there were 9,725 bankruptcies in Germany, and in 1921 there were only 2,975.

The tremendous advances in stock exchange quotations and the extraordinary activity of the industries in Germany are largely due to the depreciation of money. Fearing the continued decline of the value of money, and wishing to anticipate a corresponding rise in prices, most Germans are trying to convert their money into more reliable values. People of means buy land, houses, and stock exchange securities, while poor people clear the shops of their contents, and buy boots and clothes for years ahead. The prosperity of the German industries is rather due to the frantic home demand than to the expansion of the export trade.

A crash is bound to follow the present mania. However, such an event will not destroy the great physical and human resources which form the foundation of Germany's wealth. The Government endeavours to strengthen the wealth-creating factors of the country to the best of its ability. The railway system is rapidly being enlarged and improved. Numerous electric power stations are being created. Vast inland waterways are being constructed; among the latter is a deep canal which will connect the Rhine with the Danube and which will cost more than M. 2,000,000,000. When the reconstruction of Russia is taken in hand, Germany will probably obtain by far the largest share. Hundreds of thousands of Germans know Russian, and hundreds of thousands of Russian emigrants are living in Germany and are becoming Germanised. The Germans love work. They are naturally painstaking and progressive, and "ca'canny" is unknown to them. Owing to these factors Germany should rapidly recover, provided she enjoys peace and political stability.

REFERENCES

Statistisches Jahrbuch für das Deutsche Reich (various years and various prices, Berlin, Puttkammer & Mühlbrecht); current German official publications, periodicals, and dailies; Charles Rist, *Les Finances de Guerre de l'Allemagne* (Payot, Paris, 1921, 15 francs); J. Ellis Barker, *Modern Germany* (sixth edition, John Murray, 15s.).

The Renascence of the English Short Story—II

By Thomas Moult

In America the storyette of the mechanicians has reached a level of skill that is often hard to distinguish from original talent. The English average has seemed to sink lower and lower every year. The short-story writers who have taken any artistic pride in their work during this score of years can be almost counted on one's fingers, nor has their work, with one or two exceptions, been found as a regular feature of the popular magazines. Of this handful of writers, some are still working, and working well; and they have been recruited by a group of younger artists who, even more than their older fellows, have regarded the short story as a pursuit in itself, and by no means a side-issue of their more serious activities in literature. Some of these are inclined to the old-fashioned and some to the newer methods. In what proportions they may be classified is a point of no importance compared with the fact that, new or old, the practitioners of the present are at one in recognising the infinite possibilities of the *genre* as it is now regarded by all who have been forced to consider it elastic and no longer confined to boundaries. The short story, in a word, is being discovered afresh.

Leonard Merrick and Stacy Aumonier, for example, with a slight bias to the story of plot, are each in their own unique way contributing something suggestive and tentative to the art. Their work centres still in a single incident, clear-cut and roundly defined from the first word to the last. Stacy Aumonier may almost be said to attempt in England what O. Henry just failed to do in America—to make the anecdote something more than an anecdote. Merrick, with an ironical finesse and delicacy that are all his own, has made Henry Murger's Bohemian life, in its modern aspect, look exactly as our matter-of-fact age desires to see it. "'I am very pleased to meet you,' he said with disgust"—that is a typical line from Merrick's writings that seems to make plain the whole outlook of its in-

ventor. Again, the late Jack London, by taking the technique of Conrad and Kipling and trekking back to the primitive, has written stories which exploit the element of the unexpected in the mental as well as the physical nature of his characters with a success that here and there equals that of the early Wells.

But these, although they are to be ranked among the "re-discoverers," who have kept some of the older traditions, cannot be regarded as of anything like the importance they would gain if they were adventurers as well. There is another group of short-story writers who have been profoundly impressed by the researches of psychology, and who are now desiring to exploit the possibilities which the literature of Russia promised for the writer who takes those researches into account.

It must be confessed that the adventure which confronts them as a consequence of this is rather foolish and foolhardy. The battle, as they see it, is not between the old type of story and the new; but between the intellectual and the imaginative. It is, however, given to few authors to serve equably the two masters, imagination and intellect; and imagination is certainly at a premium among those who are now endeavouring to reconcile the demand of what is, after all, an intensely *imaginative* art-form with the demand of modern science. Whatever may be the faults of the conventionalists in short-story writing, they did, and do still, preserve some sort of proportion. Often while reading the stories of Katherine Mansfield (and to Miss Mansfield's credit, as to that of Miss May Sinclair among the older writers, we place some of the finest short stories of the episodic type written in recent years), we are disturbed by the feeling that she has absorbed the influence of the Russians not only in style and method, but also in her own imaginative revelation. We seem to be acquainting ourselves in this same writer's work with Tchekov[1] over again, severely intellectualised; not with one who has sat at his feet and come away something more than a disciple.

[1] Anton Tchekov, the greatest and most original short-story writer of modern times, was born in South Russia in 1860, and died in 1904. Just as he never tries to give the whole history of his characters from their birth to the grave in a single tale, so he never attempts the anecdote—he prefers to that the kind of story in which nothing happens at all. The supreme expression of his gift, however, is in those stories where light has been focussed for a brief catastrophic moment upon one or two main personages. In the hazy outlines which, as Kropotkin, a well-known Russian literary critic, has said, you rather guess than see, a world of complicated human relations gradually comes to focus. Take away either the distinctness or the haziness, and the picture is spoiled. Sixty of these stories have been translated by Constance Garnett and published in the Saint Martin's Library in a series of volumes not yet completed (Chatto & Windus, 3*s*. 6*d*. net each).

As with Tchekov, everything she does is self-revealing. In *Bliss, and Other Stories*, her recent volume, there are some remarkable lines concerning a tree, which may be quoted here to indicate the distance which lies between the conventional and the newer expression in the short-story form; they are lines which at one time would have been considered outside the province of an art that demands the sternest economy:—

"It was then that he saw the tree, that he was conscious of its presence just inside a garden gate. It was an immense tree, with a round, thick silver stem and a great arc of copper leaves that gave back the light and yet were sombre. There was something beyond the tree—a whiteness, a softness, an opaque mass, half-hidden—with delicate pillars. As he looked at the tree he felt his breathing die away, and he became part of the silence. It seemed to glow, it seemed to expand in the quivering heat until the great carved leaves hid the sky, and yet it was motionless. . . . Deep, deep he sank into the silence, staring at the trees and waiting for the voice that came floating, falling, until he felt himself enfolded."

This ability to extract new meaning and added beauty from our life and our surroundings is one of Katherine Mansfield's triumphs. In the above passage she is very near to her master, and yet very nearly herself, very nearly an innovator.

J. D. Beresford, whose *Signs and Wonders* and his earlier collection contain stories entirely plotless and passionless, and are of a mordant quality on the few occasions when plot and passion are present, seems to lack nothing that makes a good story of the episodic type; and yet, the kindling fire being absent, we do not look with the same confidence for some new contribution to the art as we may look to Katherine Mansfield. Two other writers are working eagerly towards that hidden future. A. E. Coppard exploits in his first book, *Adam and Eve and Pinch Me*, a clever technique and a sprightly and versatile humour that make us unconcerned how much he owes to the Russians and how much to the Irish revival—as a matter of plain truth, he owes a good deal to both. In him the intellectual quality never tips the scales quite so decidedly against the imagination. Nor does he take himself too seriously, like J. D. Beresford, nor hold himself too cheaply, like the other of the two young writers, Aldous Huxley, the author of *Limbo*. In reading A. E. Coppard's stories we feel that he has approached his work with an attitude almost as child-like, as naïve, as that of the late Padraic Pearse. And this is to his advantage, let it be added, for Pearse's untimely end, during the Dublin rebellion of 1916, will not deprive him of our recognition for his charming and original gifts as a short-story writer that rank him, with Synge, among the leading artists of his land.

It is reasonable, in summing up, and taking all these new tendencies into account, to assume that the present activity in short-story writing is not simply of experiment, but of discovery. No longer is it necessary to abide by the dogmas of twenty years ago, nor by the dogmas of the subsequent revolt. New possibilities are being realised, and just as in our own time we have witnessed a definite change in the characteristics of the novel, so for the immediate future is promised a new type of short story, a blend of all the better qualities that have appeared in its career and persisted. What that new type will eventually prove to be is a matter for everyone's speculation, although if we looked for a precursor we might find it in at least one of the older examples—that, say, by Charles Dickens, called *A Child's Dream of a Star*. In sympathetic revelation through plot and emotional analysis of the one transcendent longing of the soul, this story is surely a portent. "He grew to be a young man; and the star was shining." . . . "He grew to be an old man; and the star was shining." The refrain haunts the reader. "And the star was still shining; and it shines above his grave." It is certain that Rudyard Kipling and Henry James will no longer be antagonists in method, which must be dovetailed and amplified into something that for once will overstep the old boundaries of what has proved itself a fascinating and fruitful art.

BIBLIOGRAPHY

The Country of the Blind, and other Stories. With a Preface on the Short Story. By H. G. Wells (Nelson's Shilling Library).

A Diversity of Creatures. By Rudyard Kipling (Macmillan, 5*s.* net).

Tales of the Five Towns. By Arnold Bennett (Methuen, 6*s.* net).

Wessex Tales. By Thomas Hardy (Macmillan, 3*s.* 6*d.* net).

Love of Life. By Jack London (Mills & Boon, 2*s.* net).

The Altar of the Dead, and Other Stories. By Henry James (Macmillan, 6*s.* net).

The Collected Stories of Leonard Merrick (Hodder & Stoughton, 6*s.* net each volume).

Love a Duck. By Stacy Aumonier (Hutchinson, 8*s.* 6*d.* net).

Bliss, and Other Stories. By Katherine Mansfield (Constable, 9*s.* net).

Signs and Wonders. By J. D. Beresford (Golden Cockerel Press, 5*s.* net).

Adam and Eve and Pinch Me. By A. E. Coppard (Golden Cockerel Press, 5*s.* net).

Limbo. By Aldous Huxley (Chatto & Windus, 7*s.* 6*d.* net).

Collected Works of Padraic Pearse. Vol. II. Short Stories (Maunsel, Dublin, 10*s.* 6*d.* net).

An excellent small anthology of English short stories has recently been compiled and edited by Dr. Hugh Walker and Mr. H. S. Milford, entitled *Selected English Short Stories:* Vol. I, *Nineteenth Century*; Vol. II, *Twentieth Century*. (The World's Classics. Humphrey Milford, Oxford University Press, 2*s.* each.)

Reviews of Books

THE ORIGIN AND DEVELOPMENT OF OUR CALENDAR

The Calendar: Its History, Structure, and Improvement. By ALEXANDER PHILIP, LL.B., F.R.S. Edin. (Cambridge University Press, 7*s.* 6*d.*)

The Beginning of the Year in the Middle Ages. By REGINALD L. POOLE. (From the *Proceedings of the British Academy*, vol. x.) (H. Milford, Oxford University Press, for the British Academy, 3*s.*)

The scope of Mr. Philip's book is not so wide as his title might be taken to indicate. His main preoccupation is our own system, and primitive methods of time-reckoning do not come within his purview, while ancient calendars and the Chinese, Indian, Mexican, and Mohammedan systems are little more than mentioned incidentally. In other words, his history of the calendar starts at that point at which the approximate length of the year has been fixed, and an attempt has already been made to correct the approximation and bring it into accord with observed facts. The difficulty arises out of the lack of correspondence in periodicity in the natural time measurements, the day, the month or period of the phases of the moon, and the year. The various forms of calendar attempt to correct this discrepancy by intercalation, the insertion of one or more additional days at certain intervals, as our own calendar inserts one day at the leap years.

In its origin the calendar is essentially connected with seasonal activities and, in particular, with those of agriculture. The Egyptian calendar, owing to the length of time over which we can watch it in operation, affords a highly instructive example of this seasonal relation, as well as of the consequences of error. The annual event of fundamental importance in the life of the Egyptians, and the one of which it was necessary that the date should be known beforehand with approximate accuracy, was the rising of the Nile. The Calendar of Lucky and Unlucky Days indicates that originally the year consisted of 360 days, divided into twelve months each of 30 days. To this year of 360 days, five days were added. According to one system of dating, this took place as early as 4241 B.C.; in any case this "vague" year, as it was called, was in common use by 3000 B.C. This year, being approximately $\frac{1}{4}$ day short, failed to correspond with the natural year by one day in every four years, and in 1461 "vague" years had moved completely round the year. The discrepancy in the date of the inundation led to the institution of the Sothic year of 365$\frac{1}{4}$ days, which started with the heliacal rising of the star Sept (Sothis or Sirius) about July 19 or 20, when the Nile flood usually began. The Roman year originally had ten months, to which number Numa is said to have added two, making a year of 355 days, with an intercalation which took place either every eight, or two, years. Owing to this system of intercalation, which, with subsequent further intercalations, was in the hands of the Pontifices (or Priests), there was great confusion and uncertainty in regard to

the important dates of the year, until its reform was taken in hand by Julius Cæsar. The Julian calendar differed from its predecessor in that, instead of attempting to reconcile the lunar months with a solar year, it abandoned the lunar months and fixed the months without reference to the phases of the moon. The year was made to consist of 365¼ days with an intercalation every four years of one day. The 365¼ days were divided up into twelve monthly periods, each consisting of 30 or 31 days, excepting in the case of February.

The Julian year, like the Egyptian year, being 11 minutes and 14 seconds longer than the natural year, gave rise to a discrepancy, chiefly noticed in connection with Easter, which, when Gregory became Pope in 1572, aggregated ten days. By the Bull of 1582, ten days were dropped from the calendar, and it was provided that out of every four centurial years only those exactly divisible by 400, such as 1600, should be retained as leap years. This reform was adopted at different times by different countries. In this country it did not come into force until 1752, by which time the discrepancy had increased to 11 days, the reform giving rise to the popular cry of, "Give us back our eleven days." The Gregorian calendar has only recently been adopted in those countries which belong to the Greek Church.

There are a number of important points raised by Mr. Philip's historical survey which invite consideration, did space allow. One point of great interest is the week, and the relation of the Jewish week of seven days to the week used by the Nordic peoples, which clearly was a five-day week. Mr. Philip does not enter into the question of the origin of this arbitrary division of time. While the Jewish week is based upon the recurrence of the rest day, the origin of the Nordic five-day week is obscure. Among primitive peoples the week, which in West Africa, for instance, consists of four or five days, is often based upon the recurrence of a market.

The chief defects in our calendar to which Mr. Philip points are due to the constant fluctuation in the relation between the month-day and the week-day. As a remedy he suggests the transfer of one day from August to February. In order to establish a perpetual correspondence between month-day and week-day, the odd day annually and the odd day in leap year, it is suggested, should be excluded from numeration as days of the week. Mr. Philip's suggestion has the merit of simplicity and entails a minimum of dislocation. In so far it appears less objectionable than many of the other proposals which have been brought forward, such as the suggestion of a year of 13 months of 28 days each.

Mr. Reginald Poole's communication to the British Academy deals with a difficulty, of the greatest practical importance to historians, arising out of methods of reckoning the beginning of the year under different systems. Under the Julian calendar the year began on January 1, but before the institution of the Julian system, the Roman year began on March 1. The Franks also began their year on March 1, and Mr. Poole thinks it possible that this may have been connected with Roman military service, for which purpose the use of the older date was retained. The established usage in Western Europe up to the eleventh century was that the year began at Christmas, except in Spain, where up till the fourteenth and fifteenth centuries the year began on January 1. Generally, however, January 1 was regarded with aversion on account of its pagan associations. At about the eleventh and twelfth centuries Christmas began to be superseded by March 25, and this continued to be the official mode of reckoning in this country down to 1752. In addition, there was the Byzantine year, which began on September 1, the year reckoned from the Annunciation, nine months *before* Christmas, known as the *calculus Pisanus*, and finally a system which reckoned the year as from Easter. As a consequence, and owing to the fact that chroniclers, assuming that their system of dating is familiar to their readers, do not make clear what method has been followed, it is often extremely difficult to decide in which of two years an event is to be placed. Mr. Poole, by sifting the evidence for the chronological order of the appearance of the various systems and their geographical distribution, has done much to elucidate a very difficult problem, and his results will be of the highest value to the student and the historian.

E. N. Fallaize.

[For further reading on this subject see article on *The Roman Calendar* by Prof. W. R. Halliday, Discovery, Vol. II, No. 21, p. 238.—Ed.]

SOME BOOKS ON PSYCHOLOGY

The Psychology of Society. By Morris Ginsberg, M.A. (Methuen & Co., Ltd., 5*s*.)

The study of man's behaviour as the member of a community is almost as old as civilisation, but the subject has been approached almost exclusively in the light of preconceived theories of human conduct, and only of recent years has the attempt been made to discover "the general principles of group life and their application to particular kinds and examples of groups," and thereby to place the study of social psychology on a scientific basis.

But in a new science, especially where the data are difficult to observe and impossible to measure, the explanatory theories are bound to be tentative, and to some extent divergent, so that Mr. Ginsberg's book serves a useful purpose in reviewing and submitting them to detailed criticism. The author finds that for the most part the theories of social psychology are inadequate to the complexity of the subject, a finding that may be stimulating to the student or specialist, but likely to prove discouraging to the general reader, for whom, however, the book is probably not designed, since it presupposes a considerable acquaintance with contemporary psychology.

Prof. MacDougall's theory of instincts, in which the basis of all human activity is sought for in a group of primitive instincts common to man and the higher animals, is criticised especially for its inadequacy to explain satisfactorily the disinterested motives of conduct.

Similar criticism is directed against Prof. MacDougall's conception of a group mind as an entity transcending the individual minds of which the group is composed, a conception in which the author detects a conservative and aristocratic bias since, he says, the group mind cannot speak for itself, but is "apparently only interpreted by the 'best' minds of the community," and the idea of its superiority tends to further the preservation of a *status quo*.

The modern reaction against reason and the complementary importance given to impulse and intuition is criticised as an attempt to isolate reason artificially as a faculty separate from sense and impulse, and as a failure to regard the self-conscious personality as a whole.

The book ends with a chapter on organisation and democracy, in which a somewhat pessimistic view is taken of the possibility of true representative government by the people.

F. A. H.

The Psychology of Thought and Feeling. By CHARLES PLATT, Ph.D., M.D. (Kegan Paul, Trench, Trübner & Co., Ltd., *7s. 6d.*)

Dr. Platt has attempted the difficult task of giving a "fairly reasonably complete survey of the whole field of psychology"; but the field is a large one, and much of the territory not very definitely mapped, so that the author, in order to be comprehensive and at the same time easily read, has been compelled to make the subject appear a good deal more simple than his readers are likely to find it on closer acquaintance. For instance, some of the chapters that contain detailed instructions for improving the memory or fairly easy generalisations about education rather suggest that they fill in gaps that would otherwise be occupied by somewhat difficult aspects of the subject. The first part of the book is mainly an exposition of Prof. MacDougall's Social Psychology; the latter part of the book deals clearly and vigorously with the "subconscious mind," and as completely as is consistent with the omission of what is controversial, proceeding to a discussion of mysticism, telepathy, and spiritualism.

Dr. Platt believes in the theory of spiritualism on the grounds of its intrinsic acceptability to the human mind, for he does not consider that it is "based on any scientific foundation," and he appears to reject the so-called "spiritistic" phenomena as evidence of external agency.

A short account is given of Freud's earliest theory of the causation and treatment of the neuroses, which is clearly dealt with and is accepted by the author, although he does not subscribe to the generalisations of the Freudian school of psychology.

The volume ends with a chapter on "the delinquent," in which a well-justified plea is made for the consideration of the criminal either as a psychopath or as a potentially good citizen who is the victim of his environment, in any case as an individual to be segregated, rather than punished to vindicate the rights of society.

The substance of the book was delivered as a series of popular lectures in America, an origin that probably accounts for the rather dogmatic and sometimes colloquial style that is especially marked in the earlier portion.

F. A. H.

The Beloved Ego. By Dr. W. STEKEL. (Kegan Paul, Trench, Trübner & Co., Ltd., *6s. 6d.*)

This book was the first introduction of its author to the English-speaking public, and it will be welcomed by all those interested in analytical psychology. It is popular in character and more readable than many novels. It differs from all previous books of the kind in being the work of a poet who is also a man of science, and the literary style as well as the insight show unmistakable traces of the poet's vision. In Dr. Stekel's preface to the English edition he tells us that one of his "first and best teachers of Psychology was an Englishman—Shakespeare, now in the Heaven of the Immortals."

The book consists of nineteen sketches, the first one dealing with the subject of the book, "The Beloved Ego." In this chapter Dr. Stekel plumbs the depths of our self-love. According to him we are born egoists, and the whole education of life consists in a progression from egoism to altruism. The nature of love is analysed. We like a person who holds "our" views, a picture, when seen with "our" eyes, a poem, when it gives expression to "our" mood. And that girl pleases us who has our own traits. "We see a being who is as we would wish to be ourselves." There is an ironic touch in the description of flocks of people at the seaside or in city parks, "who are only really happy when they can show themselves for hours to their fellow men and women." The "popular sun baths are baths of self-love, and would never be taken at all if the bathers were isolated from each other." The Beloved Ego sometimes works through underestimation of self, "because all life appears in a double form (the law of bi-polarity)." These egoists are tortured by their own inferiority, they cannot trust themselves, they are what one might call inverted egoists. Dr. Stekel finds the whole world interpenetrated by our Ego-rays. "We find a person unsympathetic if he brings before our eyes our own bad qualities in caricature. We hate anyone when he personifies an unpleasant part of our soul." The chapter ends on a note of hope: "We see nothing but ego-rays which are at war with each other, an eternal chaos out of which will eventually be born the eagerly desired world of altruism."

Closely allied to self-love is the "will to power." Dr. Stekel sees in this the root cause of the fight of the sexes, which extends from marriage into social life, and comes to rich fruitage in many "neurotics who shrink from every love as from one which might put them in bonds, because they are afraid of the domination of one outside themselves."

In the remaining chapters we are introduced to characters well known to all of us. There are the "Half-Men," such as the "half-artist, half business-man"; the "half-pious, half-atheist"; the "half Don-Juan, and half-philistine." These dissociated personalities split themselves up in different endeavours, and bring nothing

to completion. Dr. Stekel sums up the whole evil of the time in the term, " Half-Men."

Next we meet the " Doubter," and find that the doubt or fear is always of himself. The true believer in himself is never in doubt. " All strong belief disinfects the soul, and kills the destructive germs of doubt. The doubter knows no true belief." He courts the " situations where his doubt can have free reign." He doubts everything, " finally also his own doubt."

The next picture in Dr. Stekel's portrait gallery is that of the smoker of psychic opium, or, in other words, the day-dreamer, both conscious and unconscious. The poppy of phantasy unfits these people for life, and they, therefore, create worlds of their own in which they garb themselves in royal purple. Reality of all kinds excites their contempt.

" Fear of Joy," " Envy," " Impatience," all have chapters to themselves, and then follows " The Unlucky Dog." It might be thought at first sight that he at least could hardly worship the Beloved Ego. But yes, Dr. Stekel shows up the " Unlucky Dog " as a supreme egoist. His ill-luck is his strong card. No one is as unlucky as he, and he reigns supreme in the kingdom of ill-luck. Back of it all is his thirst for love. " He is a beggar for love and rarely begs in vain." " As he cannot obtain the gold of love, he puts up with the copper of compassion." He gains pleasure from pain. He believes not only in his own bad luck, but that he brings bad luck to those associated with him, and thus secures the supremacy of his own ego. Dr. Stekel concludes his book by a number of Aphorisms.

J. C.

AN ANCIENT EGYPTIAN CEMETERY

Balabish, being the thirty-seventh Memoir of the Egypt Exploration Society. By G. A. WAINWRIGHT, with a Preface by T. WHITTEMORE; 25 plates and several figures in text. (George Allen & Unwin, Ltd., 42s.)

This volume is in theory merely the record of the excavation of the cemetery of Balabish in Upper Egypt in 1915. In point of fact it is considerably more than this. Mr. Wainwright is not content merely to present to his readers the material which he has found; he sets out to interpret it by ascertaining its place in the series to which it belongs. The cemetery is a particularly interesting one, for a large portion of it belongs to the so-called pan-grave[1] culture, which all authorities agree in attributing to small bodies of Nubians who intruded into Egypt during the Later Intermediate Period. Mr. Wainwright's study takes us considerably further than any previous work on the subject. His method is the detailed comparison of the objects actually found at Balabish with those found in similar cemeteries elsewhere, a method with which his work on Keftiu[2] has made us familiar. His first conclusion is that the pan-graves of Egypt proper have certain affinities with the later graves of the Nubian[3] C-group, but differ very seriously from the earlier. While agreeing with the result, and in general with the method by which it is reached, we are inclined to think that, when two cultures are being compared, the absence from the one of a rare object which occurs only once or twice in the other should not be used as an argument for difference, though, of course, the presence of a rare object (such as the net-bag of elephant's hair) in both would be strong presumptive evidence of connection. In other words, this type of argument has some value when used positively, but none when used negatively.

Mr. Wainwright next refers to the civilisation lately discovered by Reisner at Kerma, in the Sudan. He points out that not only has it features which distinguish it from the C-group culture of Nubia, but that the few examples of it found in Egypt proper are quite distinct from the ordinary pan-graves. This civilisation is mainly marked by the occurrence of a beautiful thin red pottery with black top and intermediate band of grey, the commonest shape of which is the inverted bell-shaped cup with out-curving rim. To the list given of these vases found in Egypt may be added several perfect examples found by Garstang in 1907 at Abydos, in a tomb with two loosely contracted bodies laid on the left side. It is perhaps early to decide whether these vases belong to a special civilisation, or whether they are merely the finer specimens of the art of the potters of the C-group people; in the meantime, Mr. Wainwright is certainly wise to keep the two apart.

The New Empire[4] graves of the Balabish cemetery are less important, though Mr. Wainwright has invested them with interest by a minute inquiry into the origin of the foreign pottery which they contain. It is to be wished that he could find time, despite the troubles of an Inspector's life in Egypt, to extend this examination to cover the whole field of Egyptian imported pottery, beginning with the probably foreign jugs from the tomb

[1] Pan-graves is the name given by their first discoverer to certain shallow tombs scooped in the surface sand in various parts of Egypt, and containing the bodies of persons clearly not Egyptians, accompanied by objects partly of Nubian manufacture. The resemblance of these graves to pans is, it must be admitted, by no means striking. The Later Intermediate Period covers the years 1800–1600 B.C.

[2] Keftiu was until lately believed to be the Egyptian name for the island of Crete. Mr. Wainwright's researches have established a very strong probability that it was in reality Eastern Cilicia.

[3] The remains of the early prehistoric period in Nubia have been divided chronologically into three groups, A, B, and C. The A group corresponds in time to the Predynastic and Early Dynastic Periods in Egypt (about 3500–2800 B.C.). The B group extends into the interval between the Sixth and Twelfth Egyptian Dynasties, while the C group, marked in Nubia by a very flourishing and totally non-Egyptian culture, covers the Twelfth Dynasty (2000–1800 B.C.) and extends into the Later Intermediate Period which separates this from the Eighteenth.

[4] The New Empire or New Kingdom is the name given to the period of the Eighteenth to Twentieth Dynasties (1580–1200 B.C.), the Middle Kingdom being the Twelfth, the Old Kingdom the Fourth to Sixth, and the Archaic Period the First to Third. The missing dynasties form the Earlier and Later Intermediate Periods.

of King Zer[1] and the very doubtfully "imported" pots of the predynastic period. We should all probaby lose some of our cherished illusions.

We have nothing but praise for the book. The general discussion and the masses of references show what care and affection the author has devoted to his subject. The plates are excellent.

T. E. P.

SHORTER NOTICES

A Star Atlas and Telescopic Handbook. By ARTHUR P. NORTON, B.A. (Gall & Inglis, Edinburgh, 10*s.* 6*d.*)
Astronomical Photography for Amateurs. By H. H. WATERS. (Gall & Inglis, 6*s.*)

The atlas is intended for people described as "amateur telescopists." It covers the whole Star sphere, and shows over seven thousand stars, nebulae and clusters. The maps are drawn for the epoch 1920. It should be a useful guide to the night sky.

The second book is a handbook for beginners, for those who are neither great astronomers nor great photographers, which will enable them to make the best use of the apparatus at their disposal in photographing the heavenly bodies.

Edinburgh's Place in Scientific Progress. Edited by C. G. Knott, D.Sc, F.R.S. (Chambers, 6*s.* 6*d.*)

In praise of the great men of the different sciences who have worked and received inspiration in Edinburgh. The work accomplished in each science is described by a separate living authority on it; the whole edited by Dr. Cargill Knott. The joint-authors give an interesting story of Edinburgh's contribution to Science without attempting to prove that all light and learning emanated from within the four-miles radius from Prince's Street.

The Seven Ages of Childhood. By ELLEN LYMAN CABOT. (Kegan Paul, Trench, Trübner & Co., Ltd., 12*s.* 6*d.*)

Mrs. Cabot's book is not so much a study of childhood as a description, written with great sympathy and often lyrical enthusiasm, of the doings and feelings of American children. The seven ages into which the author divides childhood are the dependent, dramatic, angular, and paradoxical age, and the age of the gang, of romance, and of problems, but some of these ages seem to be coexistent phases rather than successive stages of development.

The characteristics of each "age" are illustrated by a wealth of description and quotations from letters and conversation, but there is little or no attempt to seek for what may lie behind these changes of temperament and behaviour.

The Psychology of Medicine. By T. W. MITCHELL, M.D. (Methuen & Co., Ltd., 6*s.*)

Dr. Mitchell's clearly and carefully written outline of recent developments in psycho-therapeutics, and in particular of the growth and scope of psycho-analysis, is recommended to those who, though they have had no professional training in Medicine or Psychology, are desirous to read a concise general account of these new departments of knowledge.

[1] The tomb of King Zer, of the First Dynasty (about 3300 B.C.), was found many years ago at Abydos, some 350 miles up the Nile from Cairo.

Literature and Life. By E. B. OSBORN. (Methuen & Co., Ltd., 7*s.* 6*d.*)

Mr. Osborn is the literary editor of the *Morning Post.* It must be admitted that we opened his book expecting to find a much-needed treatise on literature as an interpreter of and influence upon life, and that we were momentarily disappointed. Only momentarily, though. We soon found ourselves being vastly entertained by a discussion of the verse-productions of lunatics. Thence we drifted on to a review of the literature of "beer," "beginning with John Still, Bishop of Bath and Wells, whose lusty song is the familiar treasure of all devout beer-drinkers:

> 'Now let them drink till they nod and wink,
> Even as good fellows should do;
> They shall not miss to have the bliss
> Good ale doth bring men to.'"

"Christmas Presents," "Love or Eugenics," and "Wills" followed, and some short, serious, and eloquent pieces on "The Greatest Poetry" and "The Unknown Muse." A most pleasant assortment of literary odds and ends, enhanced by a shrewd knowledge and suggestiveness.

The Islanders of the Pacific. By LT.-COL. T. R. ST.-JOHNSTON. (T. Fisher Unwin, Ltd., 25*s.*)
Twenty-five Years in East Africa. By JOHN ROSCOE, M.A. (Cambridge University Press, 25*s.*)

These are not books of travel, but books on anthropology. The first is by an administrator, the second by a missionary. Both authors write from long acquaintance of the men they describe, and each has succeeded in producing a book that is readable and informative, and that contains a body of information which is a genuine contribution to knowledge.

Col. St.-Johnston's main theme is that present-day Polynesians are derived from a nation which originated from the country north of Mesopotamia—the Armenoid people—and poured forth into Egypt and India, and thence to Polynesia, several thousands of years before the beginning of our era. In support of this he discusses the available evidence derived from a study of language, monuments, legend, totems, sun-myths, and the like, with wide knowledge and intelligent sympathy. The book should appeal both to ethnologists and those interested in the peoples of the Pacific.

Mr. Roscoe went out to Central Africa as a missionary in the eighties, and for twenty-five years ministered to the peoples of the lake region of Uganda. His book is a popular account of these people, their social customs, ceremonies, laws, habits, and religion.

Books Received

(Mention in this column does not preclude a review.)

MISCELLANEOUS

The Friendly Arctic. The Story of Five Years in Polar Regions. By VILHJÁLMUR STEFÁNSSON. Illustrated. (Macmillan & Co., Ltd., 30*s.*)

Lord Byron's Correspondence (chiefly with Lady Melbourne, Mr. Hobhouse, the Hon. Douglas Kinnaird, and P. B. Shelley). With Portraits. Edited by JOHN MURRAY, C.V.O. In Two Volumes. (John Murray, 25*s.*)

Personality and Power. Being the Adult School Lesson Handbook for 1922. (National Adult School Union. Paper covers, 1*s.* 3*d.*; cloth boards, 2*s.* 6*d.*)

SCIENCE

The Failure of Metals under Internal and Prolonged Stress. Edited by F. S. SPIERS, O.B.E., B.Sc. etc. (The Faraday Society, 10*s.* 6*d.*)

Space—Time—Matter. By HERMANN WEYL. Translated from German by HENRY L. BROSE. With 15 diagrams. (Methuen & Co., Ltd., 18*s.*)

Readable School Physics. By J. A. COCHRANE, B.Sc. (G. Bell & Sons, Ltd., 2*s.* 4*d.*)

Distillation Principles and Processes. By SYDNEY YOUNG, M.A., D.Sc., F.R.S. (Macmillan & Co., Ltd., 40*s.*)

Isotopes. F. W. ASTON, D.Sc., F.R.S. (Edward Arnold & Co., 9*s.*)

Notes and Examples on the Theory of Heat and Heat Engines. By JOHN CASE, M.A. (Cambridge: W. Heffer & Sons, Ltd.)

Correspondence

THE RUSSIAN FAMINE

To the Editor of DISCOVERY

SIR,

I write to protest in the name of fair play against the article on the Russian famine in the current number of DISCOVERY. It ascribes the famine solely to the misdoings of the Soviet Government, practically disregarding the main causes—the drought and the Allied blockade, together with the various wild-cat invasions by adventurers that have been financed by our Government, thus continuing the long-drawn-out agony of civil war. The supply of machinery and locomotives has failed because we blockaded the country for political reasons of our own. It is a fact well known to railway experts that the former Government of Russia had been steadily allowing the transport system of the country to deteriorate long before the war began. To ascribe the famine solely to the Soviets is, therefore, a bit of political special pleading that one would not expect to find in a publication that speaks scientifically.

And in expressing the idea that Russia can save herself unaided by other countries, her neighbours, Major Blake stands practically alone. All expert opinion is against him in this. He is apparently the victim of unconquerable political bias. This bias has led him, not only to callous inhumanity, but to a partial and one-sided view utterly unworthy of a scientific journal.

Yours, etc.,
M. P. WILLCOCKS.

35 PENNSYLVANIA ROAD,
EXETER.
March 3, 1922.

To the Editor of DISCOVERY

SIR,

Mr. Willcocks apparently objects to my opinion regarding the direct cause of the Russian Famine.

Possibly the Allied blockade and the various civil wars have helped to make matters worse, but surely these in themselves were the direct outcome of Bolshevik rule.

I maintain, from what I saw myself, from what Russian inhabitants and refugees told me, and from what I have heard from members of the various Relief Commissions working in Russia and Poland, that there can be no doubt at all that the actions of the Soviet authorities are the cause of this dreadful catastrophe. Perhaps one of the chief causes of the trouble was the Soviet order that all grain grown by farmers surplus to their own requirements should become the property of the Soviets. This at once caused farmers to sow only sufficient seed for their own needs and, when the return was less than one-tenth of that expected, the trouble really commenced. Had normal quantities been sown and only a tenth average crop resulted, that would still have been sufficient for the agricultural population to exist on.

Mr. Willcocks has misunderstood me if he believes that I think Russia can save herself unaided. This I do not say, but I do contend that all the efforts of the rest of the world cannot avert the death of millions, and therefore I suggest that Russia had best be left to herself in order that in course of years she may recover, whilst the hundreds of thousands of pounds which are badly needed in our own country should be used for the relief of distress in this country, and not sent to a nation which is neither allied to us in sympathy nor in aim, and upon which relief cannot have any effect other than in slightly prolonging the agony of the starving millions.

Yours, etc.,
WILFRID T. BLAKE.

NEW LODGE, LIMPSFIELD,
SURREY.
March 7, 1922.

[Following our usual policy of publishing criticisms of any article in our journal by readers, and of a reply by the writer thereof, we have printed the above correspondence. At the same time we wish to point out that we completely dissociate ourselves from any views on the Russian Famine, such as those expressed in both letters, approaching a political nature.—ED.]